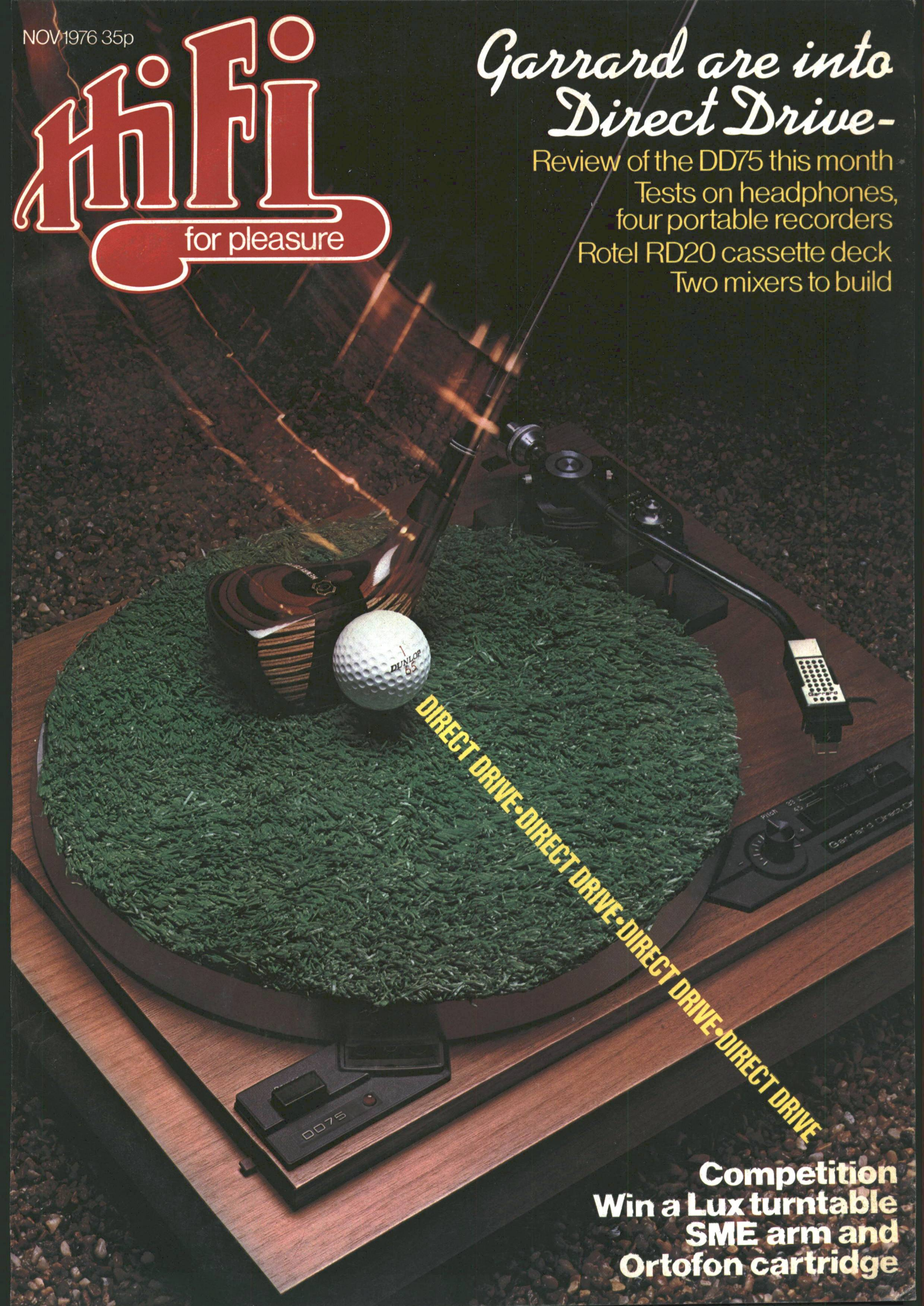
NOV 1976 35p

hi Fi
for pleasure

Garrard are into Direct Drive-

Review of the DD75 this month
Tests on headphones, four portable recorders
Rotel RD20 cassette deck
Two mixers to build



Competition
Win a Lux turntable SME arm and Ortofon cartridge

"This is by far the most incredible tuner that I have ever measured."

Angus McKenzie

Thank you Mr McKenzie, for your words in "Hi-Fi For Pleasure".

We're delighted that a top hi-fi critic should say that our CT7000 tuner is the finest he has heard.

Delighted, but not entirely surprised.

The harmonic distortion of the CT7000 is just 0·04%, the capture ratio is better than 0·7dB, and the sensitivity typically an astonishing 0·8μv. No other tuner in the world can match performance like this.

And the CT7000 won us an award in Japan, as the finest tuner design against all comers.

Still, even when you know you've set a new standard, it's good to hear someone with your experience say things like this . . .

"I can say without any reservations that it produced the finest audio quality that I have ever heard from stereo radio."

(Angus McKenzie, "Hi-Fi News")

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Yamaha. Yes.

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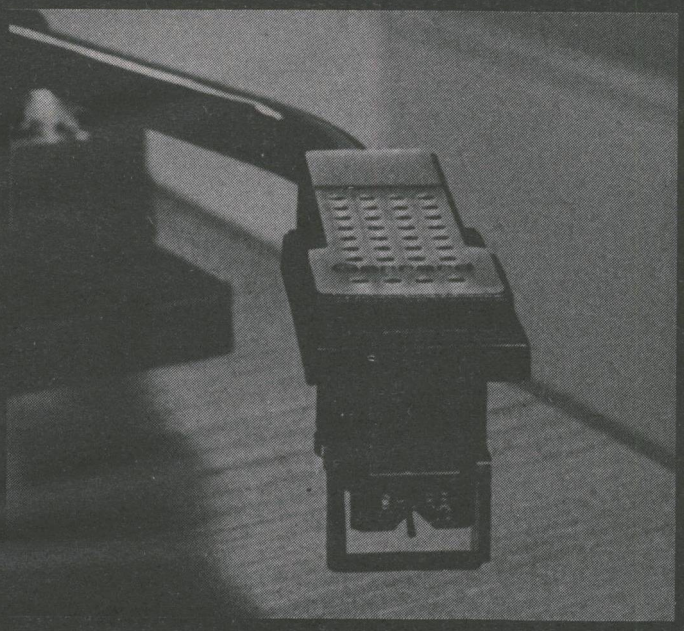
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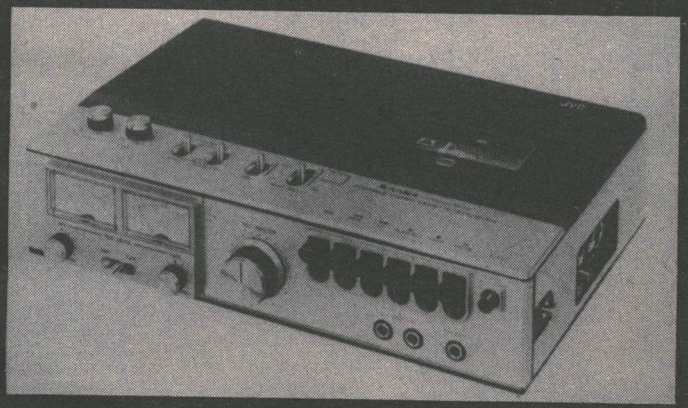
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Cover: Well, it was only a thought. Normally the DD75 will be sold with a castellated mat, instead of synthetic greengrocer's grass. Cover photographer Chris Holland





NEXT MONTH

Principle reviews lined up are the ADC Accutrac — a turntable with automatic sensing of tracks — and a JVC receiver. Static is a problem which often plagues us, so Adrian Hope in his inimitable way explores the problem and its probable cure. Another mixer — this time for quadraphonic and stereo applications — will be described for our constructor fraternity, together with another instalment in the Synthesiser series. Lo-Down on Hi-Fi continues, of course.



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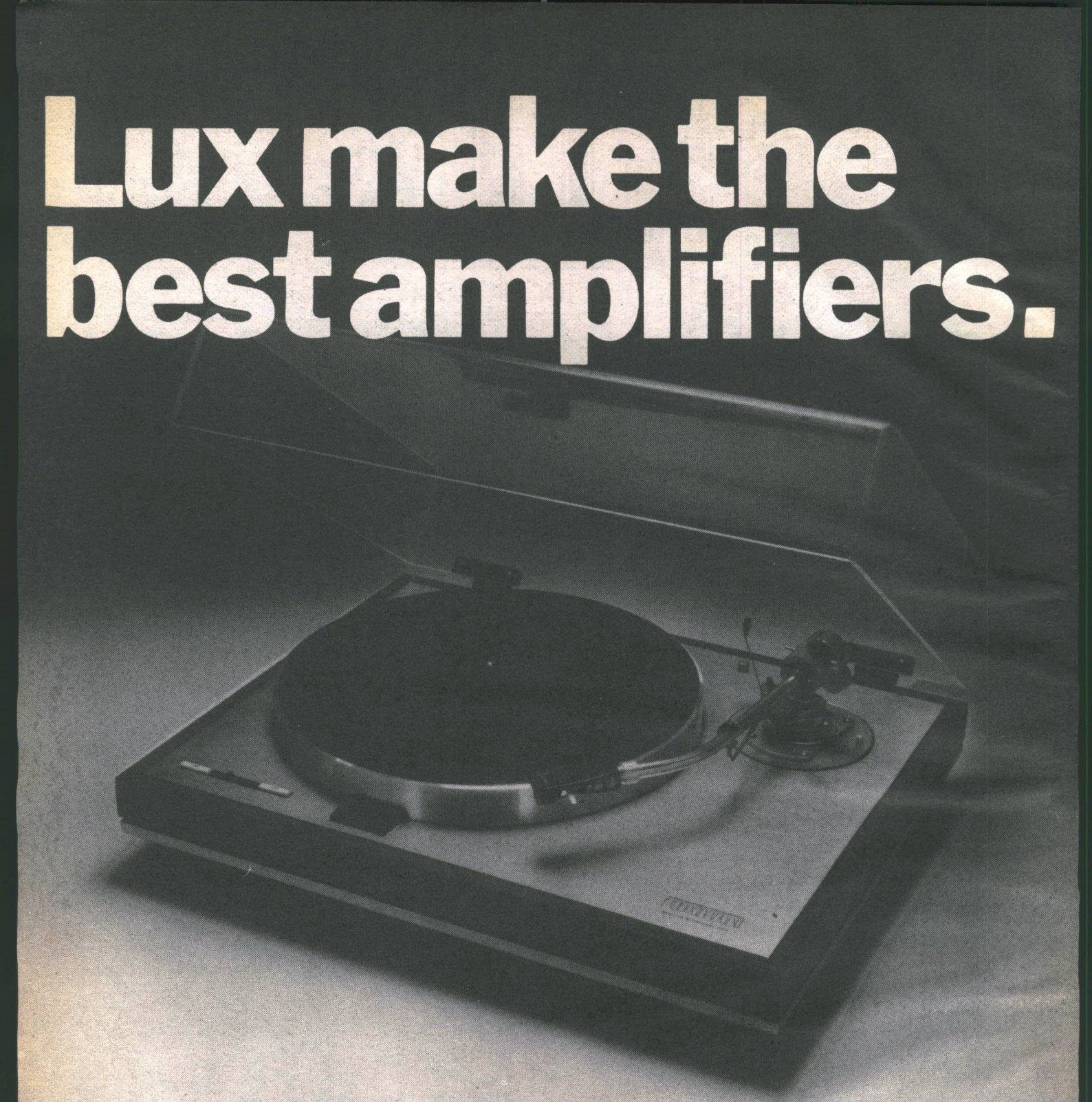
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Lux make the best amplifiers.



So what, you may think, are they doing with a turntable? Quite simply–making the best of it–and with Lux that means quite a lot–after all we made our reputation by making the best.

If you really want to know what Lux are doing with a turntable here are a few facts:

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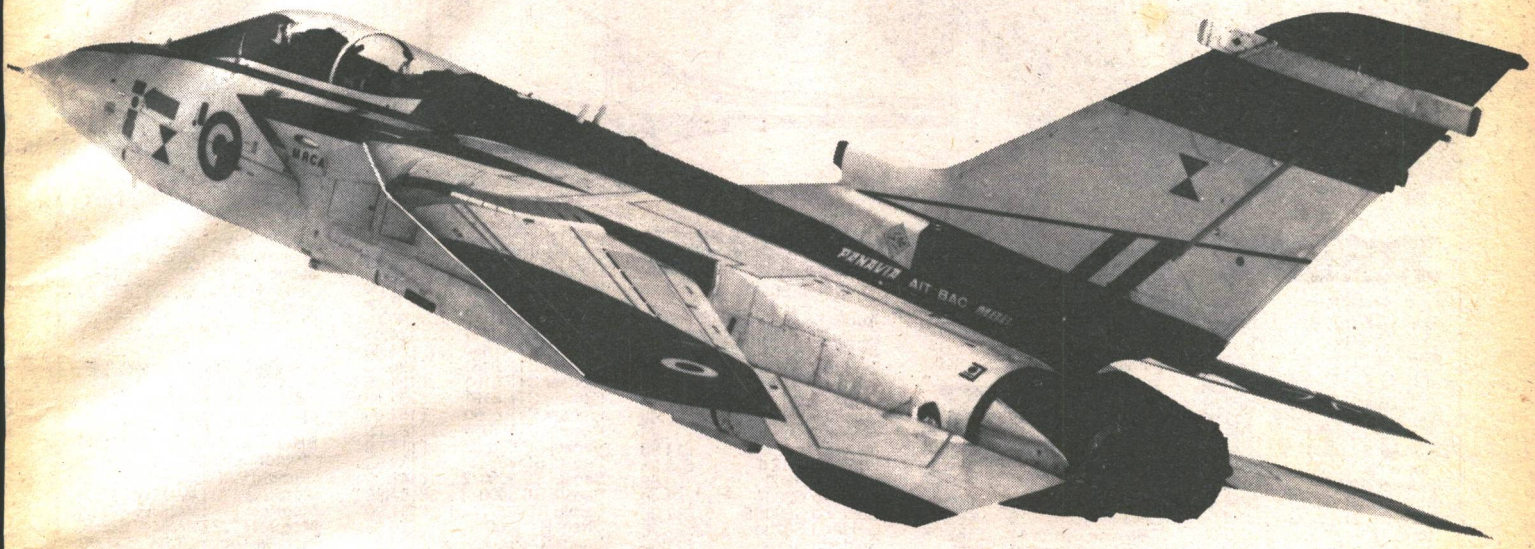
The basic design philosophy is simplicity and lack of gimmicks as can be seen from the uncluttered slim appearance, but a number of unusual features give credit to the LUX design team's work on this project. No arm is included with the turntable but a bayonet fitting arm mounting base is supplied cut out for the SME arm acknowledged by many to be the best available. For those whose choice of arm lies elsewhere spare uncut arm bases are available. Arm interchange is thus possible by a mere twist of the base mounting.

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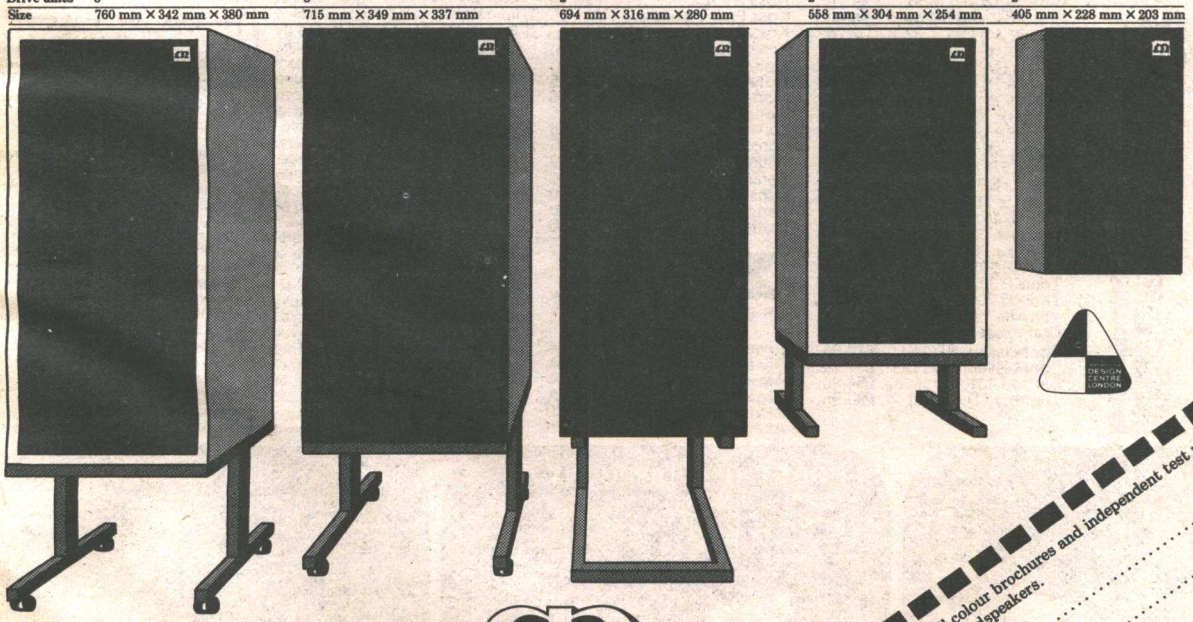
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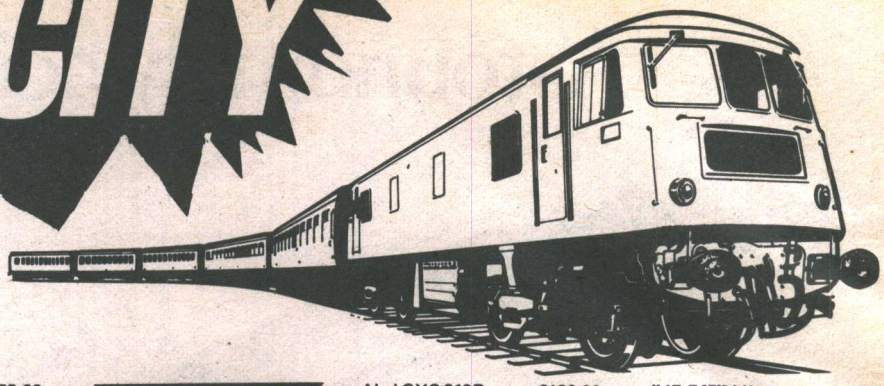
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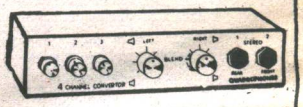
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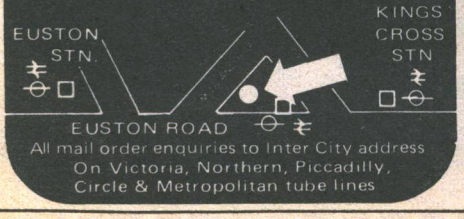
Four channel listening from normal two channel stereo



Four channel listening as distinct from stereo is a technique by which the "curtain of sound" created by the limited ambience that comes from using only two loudspeakers is dispersed and the total sound image greatly extended. This can be achieved at very great expense by purchasing a four channel amplifier with elaborate control system, a special pick-up and four loudspeakers. Such a system requires large space and great power to function to best advantage, and of course, 4 track quadraphonic records or tapes. However, there can be no more information in a quadraphonic record than in a stereo one, so by making it possible to channel stereo sound through four loudspeakers, appreciable improvement over using only two should result. This is precisely what the 4 Channel Convertor does. The output from your existing stereo system is split into four channels by this versatile unit which enables you to enlarge and match the new ambience to the environment in which the speakers function. The effect of being immersed within the music (from the four loudspeakers) becomes a thrilling new experience as exciting in its way as stereo was over mono. But unlike expensive quadraphonics, the 4 Channel Convertor costs relatively little and you need only the two additional loudspeakers to convert your existing system. The rest of your equipment remains in use as before. The unit is very easy to install and operate.

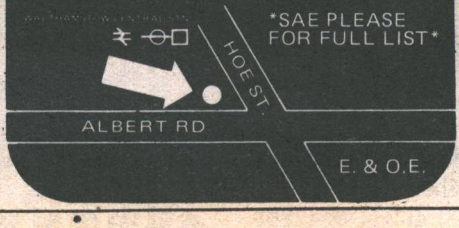
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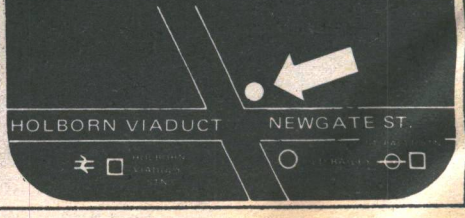
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"The SL15E Mk II . . . I shall continue to use it until something better comes along . . ."
John Wright — Gramophone

Thank you Mr. Wright, but we think you'll agree the best is yet to come.



The new Ortofon moving coil cartridges.

In developing a new range of moving coil cartridges we've designed a brand new concept as an alternative to the conventional transformer normally used with moving coil cartridges. A head amplifier that boosts the signal without any sacrifice of sound quality.

Two new cartridges for stereo are the SL20E and the MC20.

The MC20 has a new type of high resolution diamond giving around 3 times the contact surface with the record groove. Wear is reduced and the frequency response is extended to 60,000 Hz. This cartridge is also suitable for quadraphonic reproduction.

The main difference is in the type of diamond tip. The SL20E uses the highly successful naked elliptical diamond and a redesign guarantees a flat frequency response from 20 – 20,000 Hz within ± 1 db.

Both cartridges employ complex rubber damping to eliminate resonances at high frequencies and reduce distortion.

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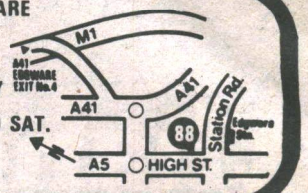
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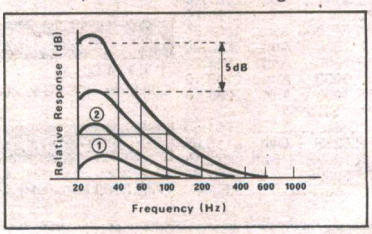
Stereo Tuner SFM1 Mk II is of advanced design and has a high sensitivity. An unusual feature is a Separation control, continuously adjustable from full stereo to mono, which permits a reduction of noise level to be obtained in difficult reception areas.

It also has meters for signal strength and for precise tuning, on/off switches for automatic frequency control and for muting circuits, and a variable muting threshold control. In addition to the usual frequency scale, a linear station-logging scale is provided.

Amplifier F608 Mk II has the reserves of power required to drive modern low-efficiency speakers fully. It is rated to give a continuous sixty watts of sinewave power per channel and will handle transient peaks of power well in excess of 200 watts.

Distortion is extremely small at all output levels. An important characteristic is that the bass controls are not centred on 1000Hz (see curves). This allows bass boost to be used for equalising loud speaker response without introducing coloration. For example, curves 1 and 2 would compensate accurately for the l.f. fall-off of monitor speakers and the smaller bookshelf speakers, respectively.

Comprehensive input and output arrangements cater for the connection of two tape recorders, allowing



transcription with filters in either the Record or Play channels, and direct A/B comparisons of recorded sound against incoming signal.

Amplifier F208 Mk II (not illustrated) is a high quality product with a number of important features: connections for ceramic and magnetic pick-ups (with switched matching), filters at 5, 7 and 10kHz, adjustable sensitivity tape connections with A/B comparison switching, and a front-panel stereo headphones socket.

Tone controls are dual concentric, the bass characteristics being the same as for the F608 (see above). Power rating is 20 watts continuous sinewave per channel, with a capacity for handling transient peaks in excess of 75 watts.

Please send me further information on: SFM1 Mk II F608 Mk II F208 Mk II
Wilmot Breeden Electronics Limited, Durban Road, South Bersted, Bognor Regis, West Sussex. PO22 9RL.

Name _____

Address _____

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Telephone: Bognor Regis 25811 (STD Code 02433)



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Tonearm: Static Balance Type, Tubular, Tracking Range 0–3 Grams

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Our Price **£136.50**

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Rec. Price £189.30

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Our Price **£64.90**

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AMSTRAD 5050	113.94	83.50
AKAI AA 1020	219.50	157.50
AKAI AA 1030	245.00	177.90
FERGUSON 3491 Stereo FM 2/4 Channel Tuner Amp with SQ Decoder 4 meters 4 x 14 watts Output	189.30	78.90
GOODMANS Module 90 Teak	177.86	127.50
GOODMANS Module 120 Teak	201.75	142.90
LEAK 1800	170.96	84.90
PHILIPS RH851 AM/FM/MPX tuner amp. stereo cassette deck, ONL, with two speakers	249.00	176.90
PIONEER SX300	104.90	78.50
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ROTEL RX602	244.50	175.90
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PIONEER SA 8500	271.22	199.90
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ROTEL RA 412	109.90	78.90
ROTEL RA 712	134.51	97.90
SANSUI AU 2200	86.10	59.50
SANSUI AU 2900	95.88	70.90
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PIONEER TX 5300	96.40	68.90
PIONEER TX 7500	189.42	129.90
ROTEL RT 224	79.90	57.50
ROTEL RT 324	102.50	73.90
ROTEL RT 724	119.90	88.50
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SANSUI SC2000/2002 Dolby Stereo Deck	202.71	147.90
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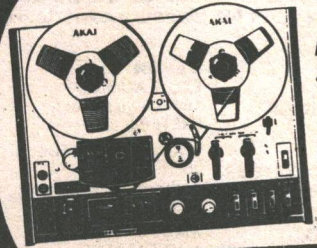
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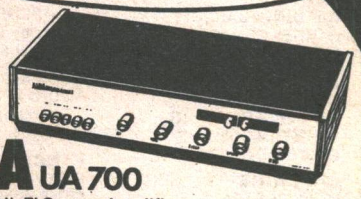
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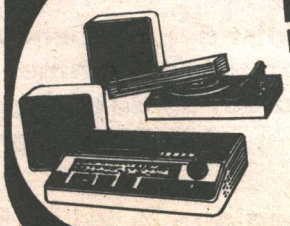
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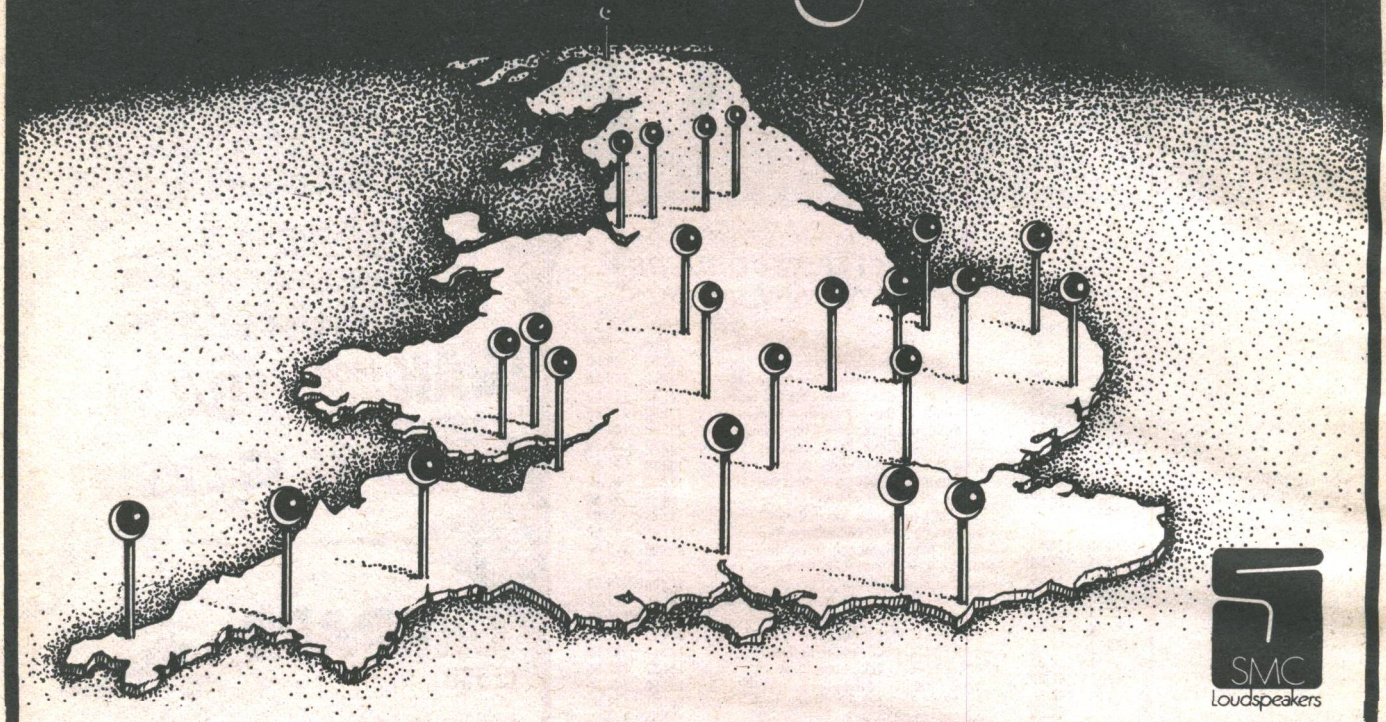
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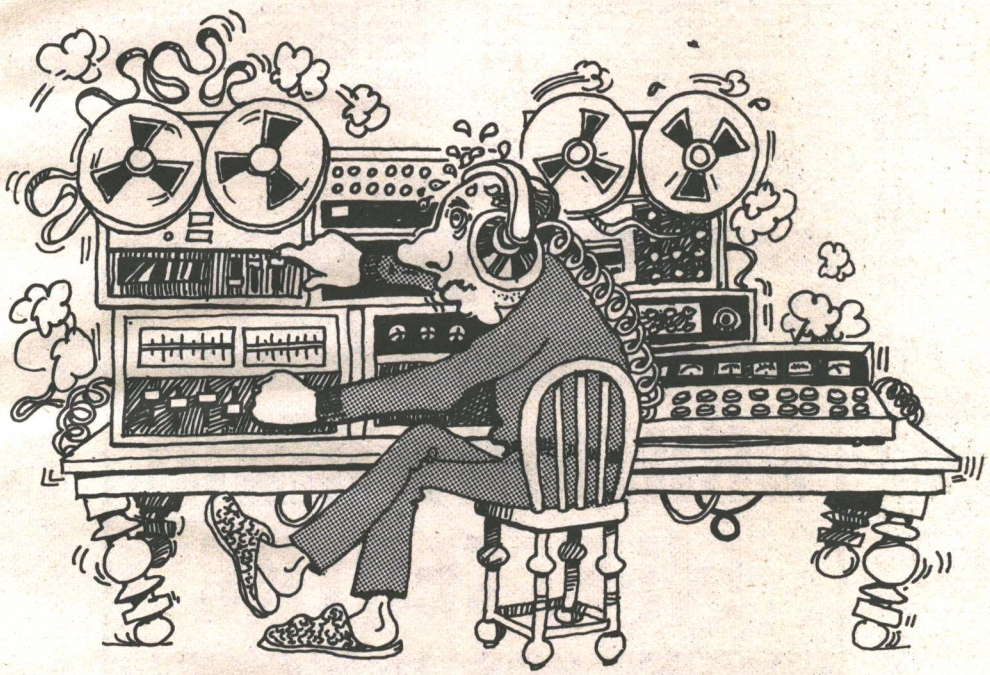
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Trio KA3500 ..... £95.00
Trio KA5500 ..... £159.50
Trio KA7300 ..... £206.95
Trio KA8300 ..... £273.50
Toshiba — full range stocked
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Technics SU7200 ..... P.O.A.
Technics SU7600 ..... P.O.A.
Technics SU3500 (wood case) ..... P.O.A.
Technics SU8600 ..... P.O.A.
Yamaha CA400 ..... P.O.A.
Yamaha CA600 ..... P.O.A.
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Yamaha CA1000 ..... P.O.A.

TUNERS
Alba UA800A £53.95
Armstrong 623 ..... P.O.A.
Armstrong 624 ..... P.O.A.
JVC JTV310 ..... P.O.A.
Quad FM3 ..... P.O.A.
Rotel ring for best prices
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Sony ST3950 ..... £139.95
Technics ST3150 ..... P.O.A.
Technics ST3500 ..... P.O.A.
Technics ST7200 ..... P.O.A.
Technics ST7600 ..... P.O.A.
Technics ST8600 ..... P.O.A.
Trio KT5300 ..... £85.00
Trio KT7300 ..... £159.50
Yamaha CT400 ..... P.O.A.
Yamaha CT600 ..... P.O.A.
Yamaha CT800 ..... P.O.A.

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Armstrong 626 ..... P.O.A.
Rotel RX202 ..... £102.95
Rotel RX402 ..... £143.95
Sansui 331 ..... £103.50
Sansui 551 ..... £135.95
Sansui 661 ..... £173.95
Sansui 771 ..... £215.95
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Trio Receivers ..... P.O.A.
Toshiba — exciting range in stock
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Yamaha CR450 ..... P.O.A.
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Yamaha CR800 ..... P.O.A.

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Aiwa AD1600 ..... £194.20
Aiwa AD1800 ..... £229.95
Aiwa AD6500 ..... £199.95
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JVC CD1950 (Special offer) £129.95
National RS260US £57.95
National RS269UA £87.95
Neal 102/103 ..... P.O.A.
Sansui SC636 ..... £118.95
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Sony TC135SD £109.95
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Technics RS273US ..... P.O.A.
Technics RS640US ..... P.O.A.
Technics RS6300AUS ..... P.O.A.
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Trio Decks ..... P.O.A.
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Yamaha TC800GI ..... P.O.A.

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Sony TC645 ..... £244.50
Toshiba PT862 ..... £124.95

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National SG1060L £166.95
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Technics SL23 ..... P.O.A.
Technics SL1400 ..... P.O.A.
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KEF 103 ..... P.O.A.
KEF 104 ..... P.O.A.
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KEF Cantata ..... P.O.A.
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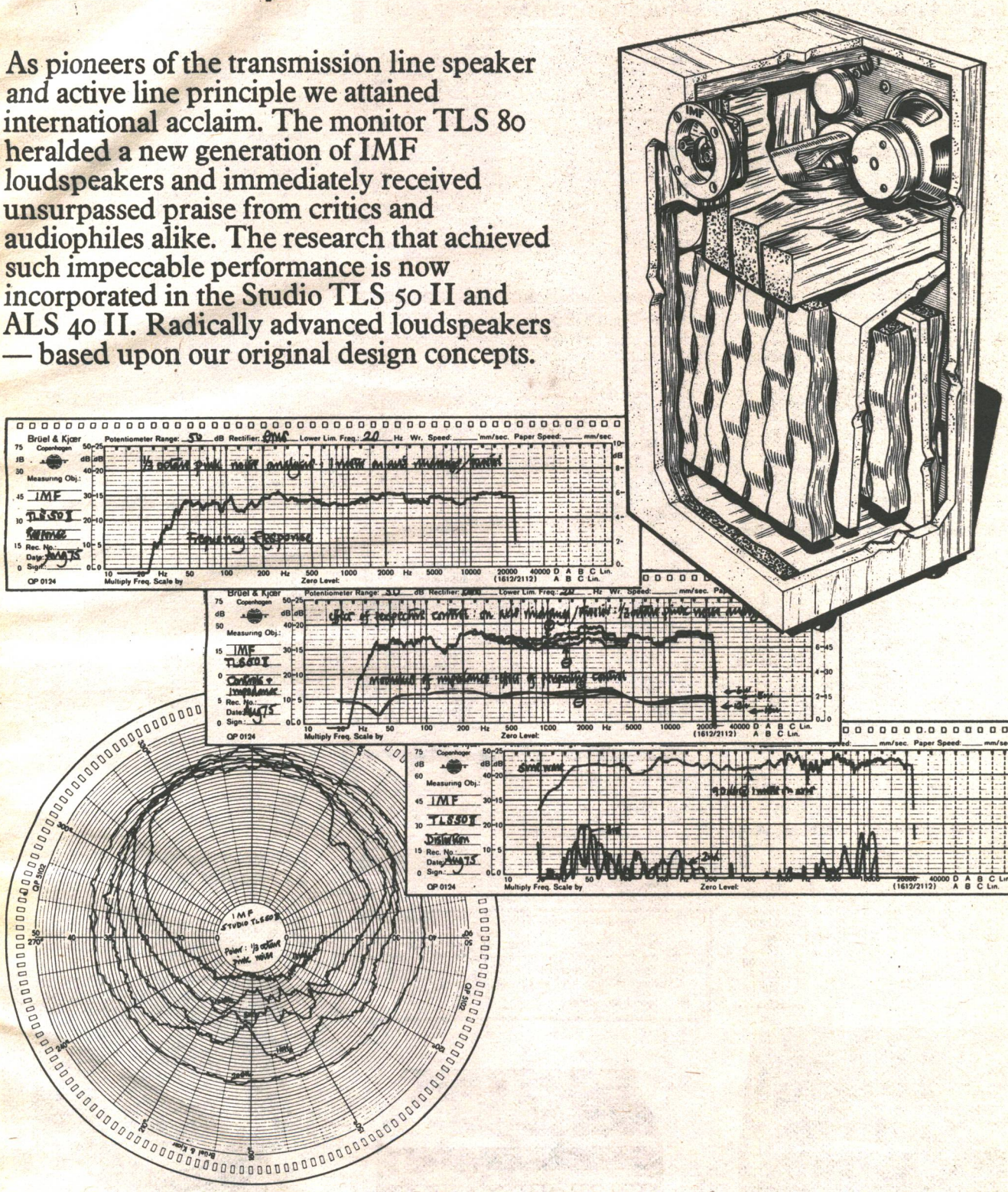
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Nakamichi 600	P.OR.	Tandberg 3541	P.O.R.
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		Yamaha CT800	P.O.R.

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ADC VLM	P.O.R.	P.O.R.
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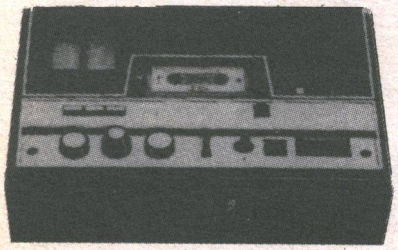
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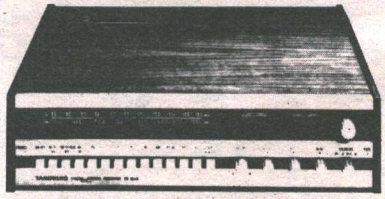
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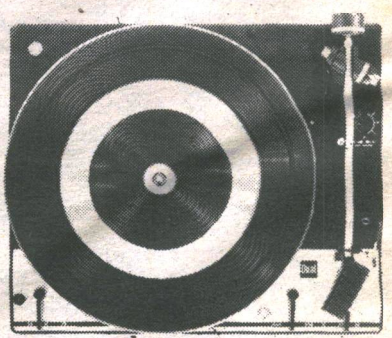
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Pioneer TX7500	£136.00
Pioneer TX9500	£187.00
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Revox A76	P.O.A.
Rotel RT224 (Sp. off.)	£46.50
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Rotel RT624 (Sp. off.)	£88.00
Rotel RT824	£111.00
Sansui TU3900	£95.00

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Armstrong 621 Teak or Rosewood	P.O.A.
Bush Arena A220 (Sp. off.)	£23.50
Cambridge Audio P110 (Sp. off.)	£127.80
Cambridge Audio P.60	£126.00
Ferrograph F208	£84.60
Ferrograph F608	£145.80
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Leak 3900A	P.O.A.
Nikko TRM210	£53.00
Pioneer SA5300	£54.00
Pioneer SA6300	£75.00
Pioneer SA7300	£116.00
Pioneer SA7500	£170.00
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Revox A78	P.O.A.
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LM 220
LM 330
SP 4000A
SP 4500A
SP 5000A — P.O.A.
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SS 5088
SS 5177
SS 3050
SS 5050
SS 1030
SS 1050
SS 2030
SS 2050
SS 2070 — P.O.A.
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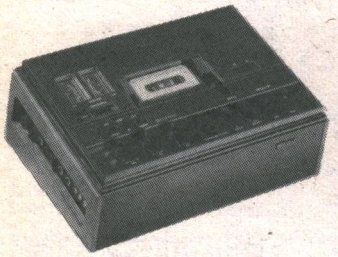
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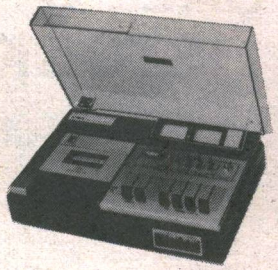
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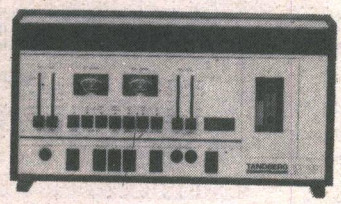
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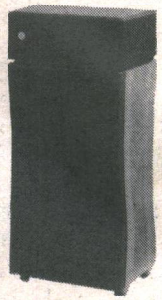
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Sansui 331	£104.60
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Rotel RX152	P.O.A.
Rotel RX402	P.O.A.
Trio KR2600	P.O.A.
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Sugden A21 & A48	P.O.A.
Trio KA1500	P.O.A.
Trio KA3500	P.O.A.

TUNERS

Armstrong 623 & 624	P.O.A.
Cambridge T55	P.O.A.
Kensonic Accuphase	P.O.A.
Lux	P.O.A.
Marantz 112	P.O.A.
Quad FM3	P.O.A.
Sugden R21	P.O.A.
Sansui TU4400	£81.00
Teleton GT202B	£41.85

TURNTABLES

Ariston RD11	P.O.A.
Dual CS601 & CS701	P.O.A.
Era Mk6X	P.O.A.
Fons CQ30	P.O.A.
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SPEAKERS

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I.M.F. TLS70 & MkIV	P.O.A.
J.B.L. full range	
KLH 331	P.O.A.
KLH 317	P.O.A.
KLH CB8	P.O.A.
Gale GS401 A or B	P.O.A.
Marantz 4G	P.O.A.
Monitor Audio MA7	P.O.A.
Monitor Audio MA5	P.O.A.
Monitor Audio MA4	P.O.A.
Monitor Audio MA1	P.O.A.
Monitor Audio MA3	P.O.A.
Quad Electrostatic	P.O.A.
Rogers BBC Mon. LS35a	P.O.A.
Rogers Export Monitor	P.O.A.
Leak 3020	P.O.A.
Leak 3030	P.O.A.
Leak 2075	P.O.A.
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SMC AL22	P.O.A.
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Videotone Sapphire	P.O.A.
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CASSETTE DECKS

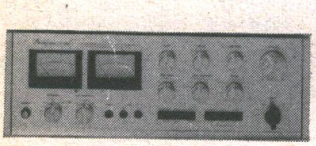
Aiwa AD 1300 Sp. price	P.O.A.
Aiwa AD 1600 Sp. price	P.O.A.
Aiwa AD6500 Sp. price	P.O.A.
Aiwa AD1800	P.O.A.
Dual C901	P.O.A.
Harman Kardon HK 1000	P.O.A.
Neal 102V	P.O.A.
Neal 103	P.O.A.
Sansui SC2000	P.O.A.
Sansui SC3000	P.O.A.
Sansui SC636	P.O.A.
Tandberg TCD310	P.O.A.
Tandberg TCD330	P.O.A.
Teac A400	P.O.A.
Teac A650	P.O.A.
Trio KX620	P.O.A.
Trio KX710	£125.90

HEADPHONES

AKG K140	P.O.A.
Koss HV1a	P.O.A.
Koss PRO 4AA	P.O.A.
Micro MX1	P.O.A.
Sennheiser HD414	P.O.A.
Stax SR5/SRD6	P.O.A.
Superex	P.O.A.

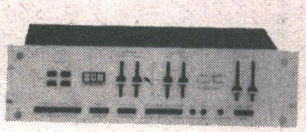
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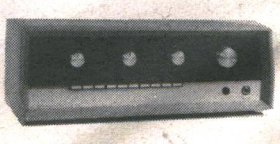
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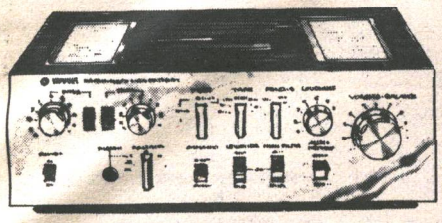
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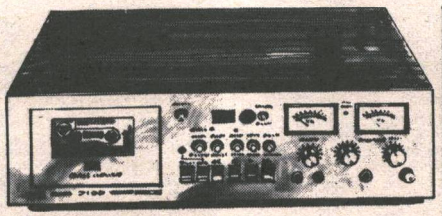
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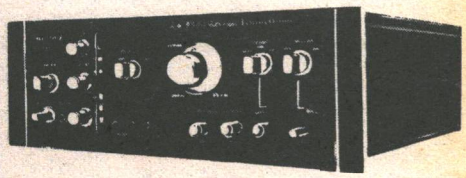
Yamaha CA1000 Amplifier

A superbly designed 'state of the art' amplifier with a host of features (note: all extremely useful and not just for effect like so many amps today). The CA1000 is capable of producing a massive 78 watts per channel into 8 ohms which makes it ideal for driving inefficient speakers. As always, Yamaha equipment is not only technically well designed but is also extremely attractive visually.



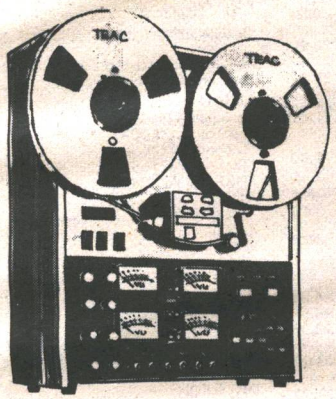
Akai GXC 710D Cassette Deck

We feel that this model is the finest that Akai has produced yet. If you like the design of the front load cassette deck look no further, the performance is very close to the best reel-to-reel machines.



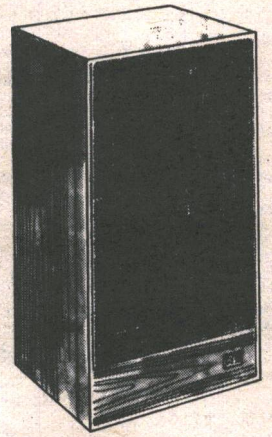
Sansui AU9900 Amplifier

We have long been admirers of Sansui equipment, but the latest range is especially exciting. From the BA5000amp which delivers a tremendous 300 watts per channel to the AV9900 (illust.) capable of a mere 90 watts per channel! The whole range has the stamp of Sansui's expert technical and engineering skills.



TEAC A3340S 4 Track Tape Recorder

A tape deck for the connoisseur. We have a number of Teac models in stock, but would particularly like to draw your attention to the A3340S which has a truly remarkable performance with either 7½ or 15ips speeds and using the recommended Maxwell UD tape.



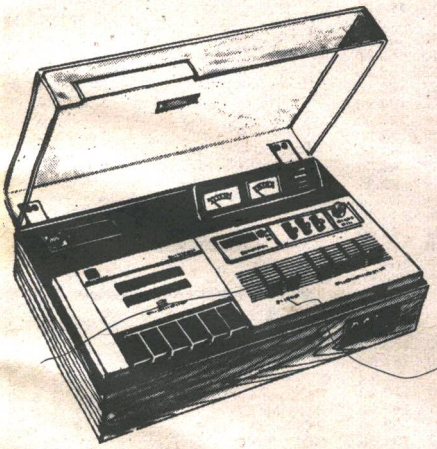
AR12 Loudspeaker

AR have now been at the forefront of loudspeaker design for some years. Their products are always of the highest quality and we invite you to hear the latest models AR12 (illust.) and AR14 both have an uncoloured and natural sound which, for the price, represent real value for money.



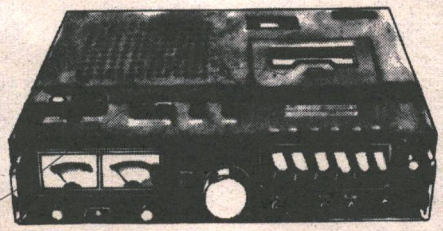
Revox A77 Tape-Recorders

Revox, the reference standard for studio tape decks for many years. The 77 series is available in many different formats in either 3¾/7½ips or 7½/15ips versions. Dolby B is available in the A77 deck and the performance can only be described as superb. Not cheap, but then you are buying possibly the finest tape deck on the market today.



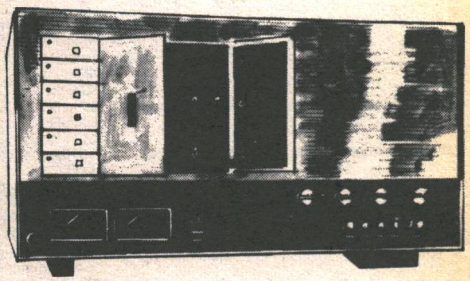
Aiwa AD 1600 Cassette Deck

Aiwa have steadily built a reputation second to none in the cassette deck field. The models AD1600 (illust.) and AD1800 have both been highly praised by the Hi-Fi press and deservedly so, for they have a specification which is truly met and which competitors are finding hard to match.



JVC CD 1635II Cassette Deck

Who would have thought possible a performance like this could be obtained from a portable cassette deck a few years ago. Features include a sen-alloy head for long life plus ANRS noise reduction system. For those who like to take their music with them and like it to be of Hi-Fi performance this machine is a must. We also have a large selection of other equipment from the JVC range.



Nakamichi 700 Cassette Deck

This cassette deck must be one of the finest if not the finest available in the UK. Sets a standard not previously thought possible for the slow 1⅞ips cassette speed. Rivals even the best open reel machines. Expensive, but worth every penny. Drop in and ask for a demonstration. We feel certain its performance will astound you.

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COMET

Stereo Amplifiers

	Rec. Retail Price Inc. VAT	Comet Price Inc. VAT
ALBA		
UA 700A	69.00	49.50
UA 900	107.95	76.90
AMSTRAD		
8000 Mk 3	37.96	27.50
IC 2000 Mk 3	56.25	40.90
FERROGRAPH		
F208 Mk II	121.50	89.90
F608 Mk II	209.25	149.90
GOODMANS		
Model 40-40	111.02	59.90
PIONEER		
SA 5300	85.86	64.90
SA 6300	105.71	79.90
SA 7300	162.62	119.90
SA 7500	238.14	169.90
SA 8500	271.22	204.50
SA 9500	363.80	274.50
SA 9900	539.80	399.90
ROTEL		
RA212	73.50	53.90
RA312	89.90	66.90
RA412	109.90	79.90
RA612	149.90	94.90
RA712	134.51	99.90
RA812	192.50	144.90
RA1312	325.00	239.90
RA1412	425.00	309.90
SANSUI		
AU 2900	95.88	71.90
AU 3900	124.55	92.90
AU 4900	150.93	112.90
AU 5900	214.59	159.90
AU 7900	290.04	220.51
SOLAVOX		
20. 10 watts. RMS per channel	45.53	28.50
30. 15 watts. RMS per channel	53.46	32.50

Tuners –

ALBA		
800A	75.00	52.50
AMSTRAD		
3000 Mk II	56.25	40.90
FERROGRAPH		
SFM 1 Mk II	147.38	107.90
PIONEER		
TX5300	96.40	69.90
TX7500	189.42	134.90
TX9500	261.87	184.90
ROTEL		
RT224	79.90	57.90
RT324	102.50	74.90
RT624	149.90	89.90
RT724	119.90	89.90
RT824	189.90	142.50
SANSUI		
TU3900	132.24	98.90
TU5900	194.88	145.90
TU7900	228.67	169.90

Tuner/Amplifiers

ALBA		
1500	115.00	79.90
AMSTRAD		
5000	97.73	64.50
5050	113.94	84.90
AKAI		
AA 1020	219.50	158.90
AA 1030	245.00	179.90
AA 1050	319.50	229.50
FERGUSON		
3491. Stereo FM 2/4 channel Tuner Amplifier with SQ Decoder, Pan balance control 4 meters 4 x 14 watts output	189.30	79.90
GOODMANS		
110 Compact inc. Turntable	Sp price	129.90
Module 90 Teak	177.86	129.90
Module 120	201.75	145.90
Module 150	294.64	199.90
LEAK		
1800	170.96	89.90
PHILIPS		
RH832 System, AM/FM/MPX Stereo tuner and pre-amplifier, turntable combination inc. two Philips RH 532 Motional feedback loudspeakers. 60. watts RMS per channel output	715.50	495.00

Tuner/Amps continued

	Rec. Retail Price Inc. VAT	Comet Price Inc. VAT
RH743 AM/FM/MPX tuner pre-amplifier for use with RH541 or RH544 MFB speakers	135.00	119.50
RH831 AM/FM/MPX tuner amp. with built in stereo Dolby cassette deck	449.10	389.90
RH851 AM/FM/MPX tuner amp. stereo cassette deck, DNL, with two speakers	249.00	179.90
RH752 Electronic search tuning	260.00	197.90
PIONEER		
SX 300	104.80	79.90
SX 450	156.33	116.90
SX 550	193.26	144.90
SX 650	271.26	203.90
SX 750	322.80	239.90
SX 850	430.45	319.90
SX 950	494.20	369.90
SX 1250. 160 watts RMS per channel	757.80	559.90
ROTEL		
RX 102 Mk. 2	107.50	79.90
RX 152 Mk. 2	124.50	89.90
RX 202 Mk. 2	137.50	99.90
RX 402	192.50	139.90
RX 602	244.50	174.90
RX 802	307.50	219.90
SANSUI		
221	125.44	93.50
331	139.41	103.50
551	182.15	135.90
661	233.45	174.90
881	374.82	279.90
8080	473.46	354.90
9090	520.59	389.90
QRX 7001 QS CD4	641.89	479.90
WHARFEDALE		
SXP	206.87	99.90

Turntables

AKAI		
AP001 inc. B & C	87.00	63.90
AMSTRAD		
TP12D inc. B and C	57.85	42.50
CONNOISSEUR		
BD1 kit	16.76	13.50
BD2A/P & C/SAU2	54.56	44.90
BD3 inc. B & C	95.63	74.25
GARRARD		
SP25 Mk IV Chass	29.81	20.90
DD75 Direct Drive inc. B & C	122.06	83.90
GOLDRING		
L80PC inc. B & C	78.75	54.90
L82PC Auto stop inc. B & C	90.00	63.90
L84PC Auto return inc. B & C	106.88	74.90
L90PC Electronic Auto stop inc. B & C	166.50	119.50
McDONALD		
MP60 Chass	23.74	14.90
PIONEER		
PL112D	80.76	59.90
PL115D	90.02	67.90
PL117D	133.49	99.90
PL510A Direct Drive	159.71	119.90
ROTEL		
RP1500 with b and c and arm	91.50	67.90
RP2500 inc. b and c auto return	114.50	74.90
RP3000 less arm with b and c direct drive	124.50	89.90
RP3000 with arm with b and c direct drive	149.90	109.90
SANSUI		
SR222P inc. b and c belt drive	85.84	61.90
FR1080P inc. b and c belt drive auto return	101.46	75.90
SR525 inc. b and c direct drive	164.04	122.90
FR8080P Direct Drive auto return inc. b and c	228.48	169.90
THORENS		
TD166/C inc. b and c	88.88	52.90
TD160/C inc. b and c	102.38	59.90
TD160 BC inc. b and c less arm	83.81	52.90
TD166 Mk IIC inc. b and c	106.87	84.90
TD160 Mk. IIC inc. b and c	122.62	97.90
TD160 Mk. IIBC inc b and c less arm	100.12	78.90
TD145 Mk. IIC inc. b and c auto lift	145.12	114.90
TD126 Mk. IIC inc. b and c auto lift	281.25	219.90
TD126 Mk. IIBC inc. b and c less arm	223.87	174.90

Turntables continued

	Rec. Retail Price Inc. VAT	Comet Price Inc. VAT
THE FOLLOWING TURNTABLES ARE COMPLETE WITH BASE, PLINTH, COVER AND CARTRIDGE. FULLY WIRED AND READY FOR USE.		
ADC		
Accutrac 4000 Auto, computer	287.10	264.90
AKAI		
AP 003 with Audio Technica ATII, magnetic cartridge, auto return	141.50	79.90
GARRARD		
SP25 Mk. IV with Shure M75/6/SM	53.61	34.90
125SB with Shure M75/6/SM	69.19	41.90
86SB Mk. II with Shure M75/6/SM	95.23	67.90
GT55P with Shure M75ED	146.19	99.90
McDONALD		
MP60 TPD with ADC K8	44.36	28.90
BDS 80 TPD Belt Drive with ADC K7E	57.33	36.90
BDS 90 TPD Belt Drive with ADC K5E	63.16	39.90
BDS95 TPD Belt Drive with ADC K5E	65.21	41.90
PHILIPS		
GA212 with GP401 mag. cartridge	99.50	79.90

Speakers

ALL SPEAKERS ARE PRICED AS PAIRS

AKAI		
SA800	121.00	84.90
SA1000	207.00	99.90
SA1200	258.00	129.90
ALBA		
300	36.95	23.90
AMSTRAD		
Acousta 2500	51.61	36.90
CELESTION		
Hadleigh	Sp. price	34.90
Ditton 11	77.95	56.90
Ditton 15	124.15	88.90
Ditton 25	262.53	188.90
Ditton 33	190.57	135.90
Ditton 44	227.06	163.90
Ditton 66	374.58	269.90
FERROGRAPH		
S1	256.50	194.50
GOODMANS		
Minister SL TK	71.60	44.90
Havant SL	88.40	58.90
Mezzo SL	130.92	89.90
Achromat 100 Monitor	110.82	69.90
Achromat 250 Monitor	162.78	104.90
Achromat 400 Monitor	214.38	129.90
Stand for 400 (pair)	21.29	14.90
RB18	72.32	49.90
RB20	92.42	64.90
RB35	132.58	89.90
LEAK		
2075	473.40	349.90
3020	119.42	89.90
3030	157.50	119.50
3050	218.00	164.90
3080	333.96	249.90
PHILIPS		
RH541 Motional feedback (MFB) built in 30 watts RMS amps	189.00	163.50
RH544 (MFB) 60 watts	297.00	257.00
PIONEER		
CST 61	203.54	119.90
CST 8	540.41	299.90
CS313A	78.37	59.50
HPM 40	186.12	139.90
HPM 60E	252.86	189.90
HPM 100	387.54	294.00
SANSUI		
ES200	192.76	144.50
SOLAVOX		
TK20	50.29	33.90
TK30	64.71	44.90
TK45	120.06	89.90
Speaker stands (pair)	16.99	12.50
WHARFEDALE		
Chevin	40.12	28.90
Denton 2XP	59.15	42.90
Linton 3XP	84.62	59.90
Glendale 3XP	115.16	84.90
Dovedale SP	197.24	139.90
Airedale SP	320.40	229.90

Speaker Kits

GOODMANS		
DIN 20 NT kit (pair)	41.32	28.90
Mezzo twin kit (pair)	72.49	49.90

Speaker Kits continued

	Rec. Retail Price Inc. VAT	Comet Price Inc. VAT
WHARFEDALE		
Linton kit (pair)	30.11	22.50
Glendale 3XP kit (pair)	66.89	49.90
Dovedale kit (pair)	85.95	63.90

Chassis Speakers

PRICED AS SINGLE UNITS

GOODMANS		
Audiom 12P	22.48	15.90
Audiom 12PG	24.36	16.90
Audiom 12PD	25.69	17.50
Axent 100	10.84	7.50
Hi Fax 750P	23.88	16.75

Cartridges

All cartridges marked * are suitable for CD4 and normal Stereo Records.

AUDIO		
Technica AT13EA	14.30	10.90
*Technica AT12S	21.02	15.90
*Technica AT14Sa	28.72	21.90
*Technica AT15Sa	41.67	31.90
*Technica AT20SLa	46.61	34.90
ADC		
*Super XLM	54.70	36.90
XLM	38.68	26.50
VLM	31.40	21.50
Q36	18.45	12.75
Q32	14.27	9.75
Q30	10.45	7.25
GOLDRING		
G800 Boxed	8.44	4.25
G800E Boxed	12.83	6.25
G800 Super E Boxed	19.58	9.75
G900 Super E	40.50	29.75
ORTOFON		
*†SL15Q	74.25	39.90
†SL15E	51.75	29.90
M15E Super	47.25	34.90
VMS20E	27.00	18.90
PHILIPS		
GP 400	24.14	8.90
GP 401	32.06	11.90
GP 412	51.38	29.90
GP 422	69.19	45.00
SHURE		
M55E	12.49	7.15
M75EJ	19.58	11.25
M75ED	23.29	13.50
M95EJ	20.25	11.75
M95ED	29.36	16.90
*M24H	37.80	21.90
V15-Mk. III	60.41	39.90
SONOTONE		
9TAHC Diam/Saph	3.65	1.90
†ORTOFON STM72 transformer for use with ORTOFON SL15Q and SL15E	18.28	11.90

Styli

ADC		
RZL for Super XLM	23.81	16.50
RXL for XLM	15.70	10.75
RVL for VLM	13.49	9.25
RK5E for K5E	9.50	6.50
RK7E for K7E	7.57	5.25
RK8 for K8	5.52	3.80
GOLDRING		
D110 Stylus (G800)	4.22	2.50
D110E Stylus (G800E)	9.45	5.50
D110SE Stylus (G800 Super E)	14.51	8.50
SHURE		
N75EJ Stylus	11.48	7.25
N75ED Stylus	16.20	10.20
N95EJ	12.83	8.25
N95ED	21.94	13.90
VN35E Stylus (V15 III)	21.94	15.25

Bases and Covers

AKAI		
DC 44 for 4000 DS	8.80	6.25
CONNOISSEUR		
BD1 plinth & cover	16.88	13.00
GARRARD		
B15 Base and Cover SP25	17.16	12.25
B20 Base and Cover 86SB, 100SB	20.70	14.50

I promise you *12 months service, including parts and labour on all goods – without charge. After the initial free 12 month period you can still rely on us to ensure that your purchases are kept in working order.*

Michael Hollingbery
Chairman

Hi-Fi Tape Recorders

	Rec. Retail Price Inc. VAT	Comet Price Inc. VAT
AKAI		
4000 DS Mk. II stereo deck	174.00	126.90
4000 DB Dolby stereo deck	249.50	169.90
GX265D stereo reverse deck	411.00	294.90
FERROGRAPH		
7502D 2-track Dolby stereo deck	478.13	379.90
7504D 4-track Dolby stereo deck	478.13	379.90
7602 High Speed	534.38	434.90
7602 Dolby High Speed	630.00	549.90
7604 Dolby High Speed	630.00	549.90
7622 Dolby High Speed	691.88	599.90
7624 Dolby High Speed	691.88	599.90
PHILIPS		
N4504 4 track DNL stereo deck	202.50	144.90
N4506 4 track DNL Professional stereo deck	320.00	246.90
PIONEER		
RT 2044 Professional 4 channel	1,549.92	1,175.00
SOLAVOX		
7 in Metal spool	Sp. price	1.50

Blank Tapes

SCOTCH DYNARANGE CASSETTES		
C60	1.07	0.59
C90	1.50	0.79
C120	2.10	0.89
SCOTCH HIGH ENERGY		
C60	1.47	0.75
C90	1.78	0.99
C90 five pack with free Head Cleaner	Sp. price	4.95
SCOTCH Chrome Dioxide Cr02		
C60	1.72	0.95
C90	2.15	1.25
C120	2.81	1.60
SCOTCH CLASSIC CASSETTES		
C60	1.75	1.40
C90	2.33	1.80
SCOTCH Low Noise 8-Track Blank Cartridges		
90 mins	2.17	1.30
SCOTCH CLASSIC CARTRIDGES		
45 mins	2.05	1.65
90 mins	2.48	2.00
SOLAVOX		
7 in metal spool	Sp. price	1.50
SCOTCH HI-FI DYNARANGE SPOOLED TAPES		
5¾ in LP 1200	4.19	2.70
7 in LP 1800	5.51	3.50
SCOTCH HI-FI DYNARANGE DOUBLE PLAY		
5¾ in DP 1800	5.51	3.50
7 in DP 2400	6.94	4.40
SCOTCH CLASSIC REEL		
7 in 1200 ft	4.98	4.00
7 in 1800 ft	6.21	5.00
7 in 2400 ft	8.41	6.80
10½ in 2400 ft	11.96	9.60
10½ in 3600 ft	14.39	11.60
10½ in 4800 ft	18.91	14.90
VIDEOCASSETTES		
VC 60	Sp. price	16.50
T.D.K. RECORDING TAPE		
TDK DYNAMIC CASSETTES		
D60	1.12	0.59
D90	1.62	0.90
D120	2.14	1.20
TDK SUPER DYNAMIC CASSETTES		
SD C60	1.32	0.69
SD C90	1.79	0.99
SD C120	2.55	1.49
TDK SUPER AVILYN CASSETTES		
SA C60	1.90	1.15
SA C90	2.70	1.70
TDK AUDUA CASSETTES		
C60	1.79	1.10
C90	2.55	1.55
TDK AUDUA SPOOL TAPE		
L1800	4.99	3.25
L3600 on metal NAB reel	13.69	8.90
MEMOREX RECORDING TAPE MRX02 Cassettes		
C60	1.34	0.79
C90	1.77	1.10
C120	2.44	1.39
C90 twin pack	—	2.00

Microphones

	Rec. Retail Price Inc. VAT	Comet Price Inc. VAT
AKAI		
ADM20	9.99	7.25
AKG		
D4	6.19	4.25
D5	9.45	6.50
D190E/Hi	41.54	29.50
SHURE		
515 SA High impedance	24.30	16.90
515 SB Low impedance	24.30	16.90

Hi-Fi Cassette Tape Recorders

AKAI		
CS34D Dolby stereo deck	138.75	99.50
CS705D Dolby Stereo Deck front load	179.50	134.90
GXC39D Dolby stereo deck	195.00	144.90
GXC310D Dolby stereo deck two capstans	241.50	139.90
GXC325D Dolby stereo deck two capstans, three heads	311.00	229.90
GXC710D Dolby stereo deck front loading	259.50	189.90
GXC740D Dolby stereo front loading, three heads, dual capstan	374.00	269.90
GXC760D Dolby stereo front loading, three heads, dual capstan, three motors, servo control	459.00	334.90
AMSTRAD		
7000 Dolby stereo deck	92.82	59.90
7050 Dolby stereo deck	105.18	73.90
7070 Dolby stereo front load	127.32	89.90
FERGUSON		
3279 stereo deck	64.95	49.90
3280 Dolby stereo deck	89.95	66.90
GOODMANS		
SCD100 Dolby stereo deck	192.86	139.90
PHILIPS		
N2511 Dolby, DNL stereo deck	149.00	112.90
N2412 Stereo recorder inc. two loudspeakers	113.50	74.90
N2408 Ski slope, stereo auto change deck inc. two 10 watt amps and DNL noise reduction	199.00	154.90
2520 Dolby & DNL stereo deck	199.00	129.90
PIONEER		
CT 4141A Dolby stereo deck	135.82	94.90
CT 5151 Dolby stereo deck	154.22	114.90
CTF 2121 Dolby stereo front load	181.59	129.90
CTF 6060 Dolby stereo front load	234.06	179.90
CTF 7070 Dolby stereo front load	263.52	199.90
CTF 8080 Dolby stereo deck front load	317.03	234.90
CTF 9191 Dolby stereo front load	374.13	249.90
ROTEL		
RD20 Dolby stereo deck	199.90	144.90
SANSUI		
SC2000 Dolby stereo deck	202.71	149.90
SC2002 Dolby stereo deck	202.71	149.90
SC3000 Dolby stereo deck	227.35	179.90
SC3003 Dolby stereo deck black	227.35	179.90

Headphones

AKAI		
ASE 11	16.45	12.50
ASE 22	24.20	17.50
AKG		
K140	21.04	13.25
K240	33.98	22.50
100	12.15	4.90
KOSS		
Easy Listener	29.14	15.90
HV 2	15.69	11.90
Technician/VFR	47.25	39.50
PRO-4AA	38.98	27.90
K 711	14.07	10.90
K6	17.27	12.50
K6/LC (with volume control)	19.74	14.50
K7	11.25	9.45
PIONEER		
SE 205	12.69	9.75

Headphones continued

	Rec. Retail Price Inc. VAT	Comet Price Inc. VAT
SE 305	19.82	14.90
ROTEL		
RH 930 Electret Condenser	37.50	24.25
SANSUI		
SH5	23.13	17.25
WHARFEDALE		
Isodynamic	28.00	15.90

Pick-up Arms & Heads

LUSTRE		
pickup arm	41.46	22.90
AUDIO		
Technica AT 1005 Mk. II	20.13	16.50
Technica AT 1009	68.66	39.90
CONNOISSEUR		
SAU2	18.00	14.50
SME		
3009 Ser 11 Fixed Head Shell	56.70	39.90
S2 Head Shell	4.79	3.45
HI-FI FURNITURE		
Schreiber self assembly Hi-Fi Housing units in wood finish and white.		
Wood finish		
14/222	59.95	44.90
14/217	49.95	39.90
14/219	29.95	23.90
14/220	32.50	24.90
White finish		
15/222	56.95	42.90
15/217	47.50	37.90
15/219	28.50	22.90
15/220	31.00	23.50
Send for illustrated leaflet		

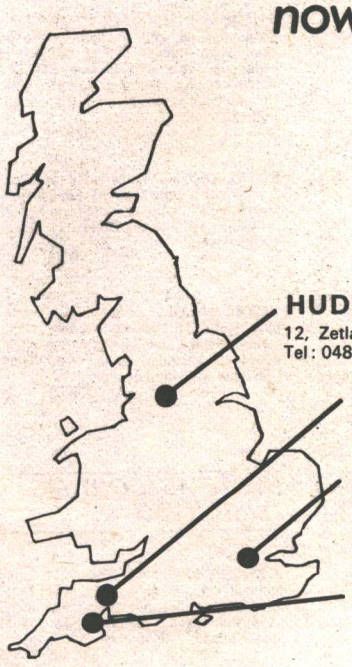
Hi-Fi Stereo Systems Complete

ALBA		
852	69.95	35.90

HI-FI Stereo Systems cont.

	Rec. Retail Price Inc. VAT	Comet Price Inc. VAT
DECCA		
5326 Compact 3 inc. stand with radio and decoder	158.85	89.90
Compact 10 with radio decoder	169.26	114.90
5328 Audio 10 with radio decoder	143.10	107.90
FERGUSON		
3047	61.85	42.90
3457 with radio and decoder	112.10	71.90
3475 with radio and decoder	143.95	109.90
GEC		
4022H with radio and decoder	100.80	67.50
HMV		
2046	87.95	61.90
ITT		
KA1026 inc. speakers	65.00	49.90
PYE		
5002 with radio and decoder	116.55	69.90
5003 with radio decoder and stand	142.70	89.90
MUSIC CENTRES		
BUSH		
Arena BS 3042 with stereo cassette	224.10	169.90
DECCA		
5339 with stereo cassette	242.10	165.90
FERGUSON		
3470 with stereo cassette	201.75	135.90
3471 with stereo cassette	159.95	119.90
GEC		
2817 with stereo cassette	229.40	129.90
GRUNDIG		
Studio 3000 with stereo cassette	326.26	283.90
PIONEER		
M6500 with stereo cassette (speakers extra)	387.93	298.00
CS313A speakers (pair) (for above)	78.37	59.50

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SOLAVOX 20 amplifier 10 watts RMS per channel plus McDonald MP60 turntable de luxe base and cover, fitted with ADC K8 magnetic cartridge plus two Wharfedale Chevin loudspeakers.	130.01	**86.30**
ALBA UA700A amplifier 10 watts per channel with McDonald MP60 TPD1 turntable de luxe base and cover, ADC K8 magnetic cartridge plus two Alba UA300 loudspeakers.	150.31	**102.30**
SOLAVOX 30 amplifier 15 watts per channel plus McDonald MP60 turntable de luxe base and cover, fitted with ADC K8 magnetic cartridge plus two Solavox TK30 loudspeakers.	162.53	**106.30**
AMSTRAD IC2000 Mk 3 amplifier 2 x 25 watts RMS plus McDonald MP60 turntable TPD1 de luxe plinth cover and ADC K8 magnetic cartridge plus two Solavox TK30 loudspeakers.	165.32	**114.90**
AMSTRAD IC2000 Mk 2 2 x 20 watts plus Amstrad TP12D belt drive turntable with a Shure M55E and two Amstrad 2500 loudspeakers.	178.20	**127.44**
ALBA 1500 tuner amplifier 2 x 10 watts with MP60 TPD1 turntable de luxe base and cover fitted ADC K8 magnetic cartridge plus 2 Alba UA300 loudspeakers.	196.31	**132.70**
ROTEL RX102 Mk. 2 AM/FM/MPX tuner amplifier 2 x 10 watts RMS plus McDonald MP60 turntable, TPD1 de luxe plinth and ADC K8 magnetic cartridge, with two Alba UA300 loudspeakers.	188.81	**132.70**
AMSTRAD 5000 tuner amplifier AM/FM/MPX 2 x 25 watts RMS with Garrard SP25 Mk 4 turntable with Garrard plinth, hinged lid and Shure M75/6/SM magnetic cartridge plus two Amstrad 2500 loudspeakers.	202.95	**136.30**
PIONEER SA5300 amplifier 2 x 12 watts RMS plus Garrard 125SB belt drive, turntable, plinth, cover, fitted with Shure M75/6 magnetic cartridge plus two Wharfedale Denton 2 XP loudspeakers.	214.20	**149.70**

SYSTEMS COSTING UP TO £200

AMSTRAD 5000 tuner amplifier 2 x 25 watts RMS with Amstrad TP12D belt drive turntable and Shure M55E magnetic cartridge plus two Amstrad 2500 loudspeakers.	219.68	**151.05**
SANSUI 221 tuner amplifier AM/FM/MPX 2 x 10 watts RMS with a McDonald BDS 50 belt drive turntable, base and cover fitted with ADC K7E magnetic cartridge plus two Wharfedale Chevin loudspeakers.		
ROTEL RA312 amplifier 2 x 18 watts RMS plus McDonald BDS90 belt drive turntable base, cover and ADC K5E cartridge plus two Wharfedale Linton 3XP loudspeakers.	237.68	**163.70**

SYSTEMS COSTING UP TO £200 Cont.

GOODMANS Model 40-40 amplifier 2 x 30 watts RMS plus the new Garrard 125SB turntable fitted plinth, cover and Shure M75/6/SM magnetic cartridge plus two Goodmans RB35 loudspeakers.	312.79	**191.70**

SYSTEMS COSTING UP TO £250

SANSUI AU2900 amplifier 2 x 17 watts plus McDonald BDS95 belt drive turntable with base, cover, fitted ADC K5E magnetic cartridge plus two Celestion Ditton 15 loudspeakers.	285.24	**202.70**
SANSUI 331 tuner amplifier AM/FM/MPX 2 x 15 watts RMS with a McDonald BDS 95 TPD belt drive turntable, base and cover fitted with ADC K5E magnetic cartridge plus two Wharfedale Linton 3XP loudspeakers.	289.24	**205.30**
ALBA UA900 amplifier 2 x 33 watts RMS with McDonald BDS95 belt drive turntable fitted ADC K5E magnetic cartridge plus two Goodmans RB35 loudspeakers	305.74	**208.70**
PIONEER SA6300 amplifier 2 x 22 watts RMS plus Pioneer PL112D turntable with base, cover and Shure M75ED magnetic cartridge plus two Wharfedale Linton 3XP loudspeakers.	294.38	**213.20**
LEAK 1800 tuner amplifier 2 x 25 watts with a Garrard 86SB Mk 2 belt drive turntable with base, cover fitted with Shure M75/6 magnetic cartridge plus two Wharfedale Linton 3XP loudspeakers.	350.81	**217.70**
PHILIPS RH851 AM/FM/MPX tuner amplifier 2 x 15 watts Integral stereo cassette deck with Philips D.N.L. circuit supplied complete with two Philips RH442 loudspeakers plus Garrard 125SB belt drive turntable with base, cover and Shure M75/6S cartridge.	318.19	**221.80**
ROTEL RX202 AM/FM/MPX tuner amplifier 2 x 20 watts plus Garrard 125SB belt drive turntable plinth, cover and Shure M75/6/SM cartridge with two Celestion Ditton 15 loudspeakers.	330.84	**230.70**
ROTEL RA412 amplifier 2 x 25 watts RMS plus Rotel RP1500 with arm, belt drive turntable base, cover fitted with an ADC Q36 magnetic cartridge plus two Wharfedale Glendale 3XP loudspeakers.	335.01	**245.45**

SYSTEMS COSTING OVER £250

PIONEER SX450 AM/FM/MPX tuner amplifier 2 x 15 watts with PL112D belt drive turntable inc. plinth hinged cover and Shure M75ED magnetic cartridge plus two Wharfedale Linton 3XP loudspeakers.	345.00	**250.20**
WHARFEDALE SXP tuner amplifier 2 x 30 watts RMS plus Garrard 86SB belt drive turntable with base, cover fitted with Shure M75/6S magnetic cartridge plus two Wharfedale Glendale 3XP loudspeakers.	417.26	**252.70**

SYSTEMS COSTING OVER £250 Cont.

	Rec. Retail Price Inc. VAT	Comet Price Inc. VAT
GOODMANS Module 90 AM/FM/MPX tuner amplifier 2 x 30 watts RMS plus the Garrard 125SB turntable, belt drive, 'S' type arm, fitted plinth cover, and Shure M75/6/S magnetic cartridge with two Goodmans RB35 loudspeakers.	379.62	**261.70**
AKAI AA1020 AM/FM/MPX tuner amplifier 2 x 20 watts RMS plus Akai AP003 turntable with Audio Technica AT11 magnetic cartridge and two Wharfedale Linton 3XP loudspeakers.	445.62	**298.70**
ROTEL RX402 AM/FM/MPX tuner amplifier 2 x 25 watts RMS plus Rotel RP1500 belt drive turntable, base, cover and ADC Q36 magnetic cartridge with two Wharfedale Glendale 3XP loudspeakers.	417.61	**305.45**
ROTEL RA612 amplifier 2 x 35 watts RMS plus Rotel RP1500 with arm, belt drive turntable base, cover and ADC Q36 magnetic cartridge plus two Goodmans Achromat 400 loudspeakers.	474.23	**305.45**
PIONEER SX550 tuner amplifier 2 x 20 watts plus Pioneer PL112D belt drive turntable and Shure M75ED magnetic cartridge with two Celestion Ditton 15 loudspeakers.	421.46	**307.20**
FERROGRAPH F208 Mk 2 amplifier 2 x 20 watts, plus the new Garrard GT55P turntable fitted base Cover and Shure M75ED magnetic cartridge with two Leak 3030 loudspeakers.	425.19	**309.30**
SANSUI 551 AM/FM/MPX tuner amplifier 2 x 20 watts with Garrard 86SB belt drive turntable, hinged lid, and fitted with Shure M75/6 magnetic cartridge plus two Sansui ES200 loudspeakers.	470.14	**348.30**
PHILIPS RH743 AM/FM/MPX tuner pre amplifier 4 wave band manual FM plus 5 pre set FM, with Philips GA212 belt drive turntable fitted with GP401 magnetic cartridge plus two 30 watts RMS motional feedback RH541 loudspeakers.	432.50	**362.90**
ROTEL RX 602 AM/FM/MPX tuner amplifier 2 x 35 watts RMS plus Rotel RP1500 turntable and ADC Q36 magnetic cartridge with two Goodmans Achromat 400 loudspeakers.	568.83	**385.45**
AKAI AA1030 AM/FM/MPX stereo tuner amplifier 2 x 30 watts RMS plus Akai AP003 belt drive turntable, base cover and fitted Audio Technica AT11 cartridge plus two Celestion Ditton 33 loudspeakers.	577.07	**395.70**
PHILIPS RH752 AM/FM/MPX tuner amplifier with Electronic search tuning 2 x 30 watts output plus Philips GA212 belt drive turntable fitted with GP401 magnetic cartridge and two Celestion Ditton 33 loudspeakers.	550.07	**413.70**
PIONEER SX650 tuner amplifier 2 x 35 watts RMS plus Pioneer PL112D belt drive auto return turntable and Shure M75ED magnetic cartridge with two Pioneer HPM40 loudspeakers.	561.17	**417.20**
GOODMANS Module 150 tuner amplifier MW/LW/FM/MPX with 8 pre set FM push button tuner Garrard DD75 direct drive turntable with base, cover and Shure M95ED cartridge plus two Goodmans Achromat 400 loudspeakers.	660.44	**430.60**

SYSTEMS COSTING OVER £250 Cont.

	Rec. Retail Price Inc. VAT	Comet Price Inc. VAT
ROTEL RX802 AM/FM/MPX tuner amplifier 2 x 50 watts RMS plus Rotel RP1500 turntable and ADC Q36 magnetic cartridge with two Celestion Ditton 44 loudspeakers.	644.51	**464.45**
PHILIPS RH831 AM/FM/MPX tuner amplifier 2 x 25 watts with Integral stereo Dolby cassette deck, plus Garrard 86SB Mk II belt drive turntable, base, cover fitted with Shure M75/6S magnetic cartridge, and two Wharfedale Glendale loudspeakers.	659.49	**542.70**
FERROGRAPH F608 amplifier 2 x 60 watts RMS plus Ferrograph SFM 1 Mk 2 FM/MPX tuner with a Garrard GT55 turntable with fitted base, cover and Shure M75ED. magnetic cartridge plus two Ferrograph S1 loudspeakers.	759.32	**552.20**
PIONEER SX850 tuner amplifier 2 x 65 watts RMS plus Pioneer PL510A direct drive turntable with the Goldring G900 Super E "micromass' magnetic cartridge and two Pioneer HPM 60E loudspeakers.	883.52	**659.45**
ROTEL RA1412 amplifier 2 x 110 watts RMS plus Rotel RP3000 inc. arm direct drive turntable inc. base, cover and Goldring G900 Super E magnetic cartridge plus two Wharfedale Airedale monitor loudspeakers.	935.80	**679.45**
PHILIPS RH832 Quadraphonic system, LW/MW/SW/FM/MPX/AFC stereo tuner/amplifier with built in SQ decoder, integral electronic controlled turntable fitted with Philips GP422 Super M 4 channel cartridge, with 2 RH544 front channels and 2 RH532 rear channel motional feedback speakers—giving a true 240 watts RMS power.	1,012.50	**752.00**
SANSUI 9090 tuner amplifier AM/FM/MPX with the Sansui SR525 direct drive turntable and the New G900 "micromass" magnetic cartridge plus two Wharfedale Airedale loudspeakers.	1,045.53	**772.45**
SANSUI QRX7001 Quadraphonic system, AM/FM/MPX four channel tuner amplifier featuring QS, and CD4 decoders plus Sansui SR222P belt drive turntable, plinth, cover and the ADC Super XLM CD4 magnetic cartridge with four Sansui ES 200 loudspeakers.	1,167.95	**867.70**
PIONEER SX1250 AM/FM/MPX stereo receiver featuring a massive 160 watts RMS output per channel. Both channels driven into 8 ohms, a state of the art unit with all the sophisticated useful facilities you would expect from a top of the line product, such as a multipath FM indication DB. Stepped volume control and probably the finest FM and Audio performance achievable, coupled with the Pioneer PL510A direct drive turntable including plinth, cover and a Goldring G900 Super E magnetic cartridge plus two Pioneer HPM100 four way loudspeakers incorporating 12 inch. Carbon fibre bass cones for strength, light weight and rigidity. This then is a system for the sophisticated Connoisseur of Hi-Fi who must have the best	1,345.55	**1,003.55**
PIONEER SA990 amplifier 2 x 110 watts RMS, plus pioneer TX9500 AM/FM/MPX 5 gang front end tuner, Sansui SR525 direct drive turntable, plinth, cover and Goldring G900 Super E cartridge with two Wharfedale Airedale SP loudspeakers plus Pioneer CTF 9191 front loading cassette deck.	1,700.74	**1,216.35**

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PLEASE NOTE
All prices include VAT at 12½%
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★2 SERVICE

We are always *willing* to demonstrate equipment, *in fact* we prefer customers to hear what they are buying, that "advice" you've been given might not be good advice. Our aim is to provide you with the best equipment available for your budget, that way everybody's happy.

★3 CREDIT TERMS

Any goods of £50 or over are available on credit terms, and goods of £100 or over can be purchased by *mail* on credit. Drop us a line stating the items required and we will send a quotation of the credit terms available. We also accept payment by ACCESS or BARCLAYCARD.

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For customers unable to call we operate an efficient mail order service. Your order is acknowledged so that you will know when to expect delivery, and if we haven't got what you want in stock your payment is returned immediately.

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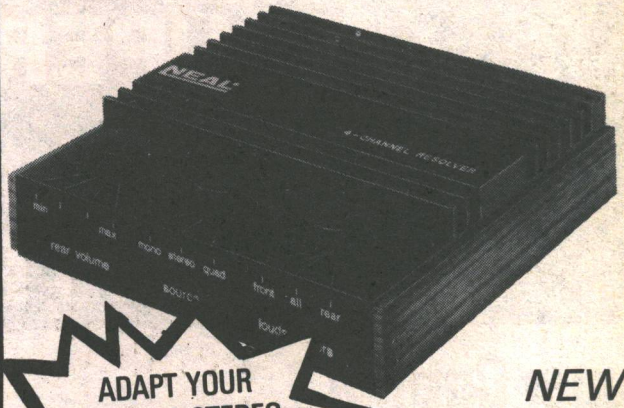
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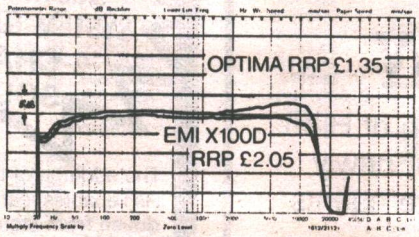
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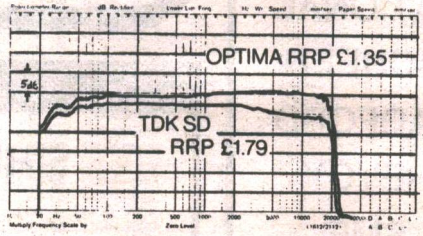
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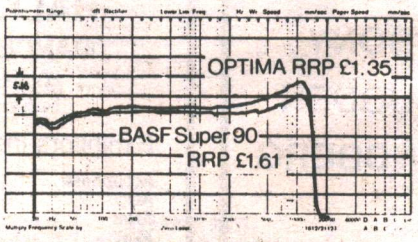
We took 3 leading Super Quality Cassettes available to the Hi-Fi public to use as reference to compare the frequency response characteristics with Pyral Super Optima.



Optima with EMI X100D



Optima with TDK SD



Optima with BASF Super 90

All RRP are at time of going to publication. All cassettes tested were C90

TEST PROCEDURE

Three cassette decks were used to give a better spread of tests on machines available to the Hi-Fi enthusiast. In the case of Graph 1 the Toshiba PC 4030 deck was used, Graph 2 the AKAI GXC 310D, Graph 3 the Nakamichi 700.

The input level was –20dB ref Dolby level. Test equipment was based on B & K 2010 Analyser and B & K 2307 level recorder.

The bias setting was as shown on the graphs.

Whereas Pyral are conscious that frequency response characteristics do not completely define the performance of a cassette, the graphs service to illustrate the performance of the new Pyral Super Optima cassette on three quality cassette decks. However, there are many quality cassette decks with differing bias and equalisation characteristics, so fill in the slip below and confirm for yourself that with

pyral
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Pyral reserve the right to alter or modify published specifications to incorporate improvements resulting from research.

W.H.F.11.



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TA 5650 V-Fet Integrated Stereo Amplifier
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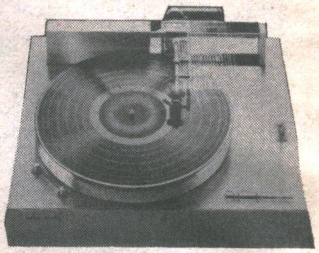
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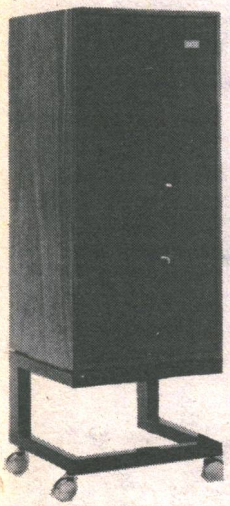
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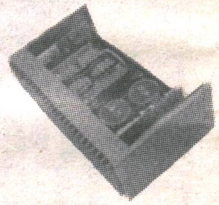
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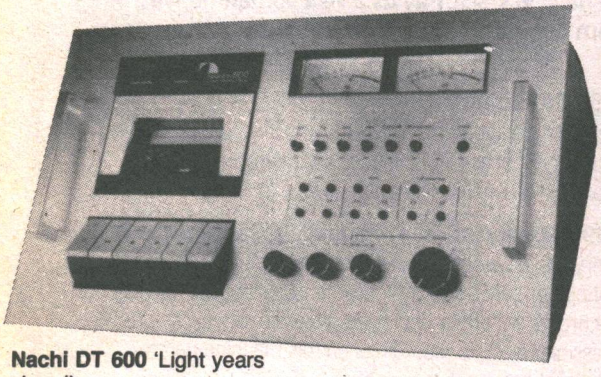


Spendor BCIII One of our Ref. speakers.

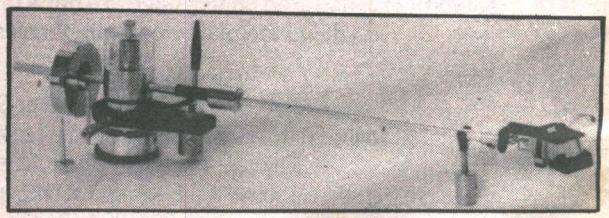


What else is there to say about **Quad.** Don't say anything just listen

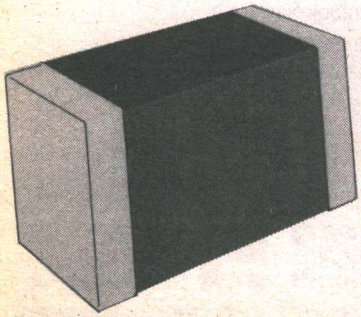




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There's a very thin line separating superb stereo receivers from good stereo receivers.



This is the distinctive line of the new generation of stereo receivers by Toshiba.

The way they look tells you a lot about the way they are built. These beautifully finished, split-level cabinets house engineering which is painstakingly precise.

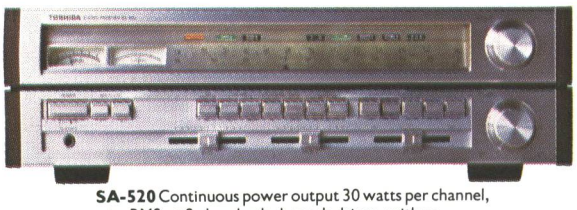
The look is different, but the performance is unmistakably Toshiba.

Each model incorporates Toshiba's prize-winning P.C.T. (Perfect Crystal Technology) ultra-low noise transistors (50% of noise level at 120 Hz, and 30% of noise level at 10 Hz, compared to the noise level of conventional low-noise transistors), resulting in a substantial improvement in S/N ratio in the low frequency spectrum.

Write to us for the address of your local Toshiba dealer. Ask him to demonstrate the 'distinctive line' for you. He'll know exactly what you mean.

SA-620 Continuous power output 50 watts per channel, min. RMS at 8 ohms, both channels driven, with no more than 0.4% total harmonic distortion, from 20 Hz to 20,000 Hz.
Continuous power output at 1,000 Hz (both channels driven): 55 watts per channel (8 ohms)

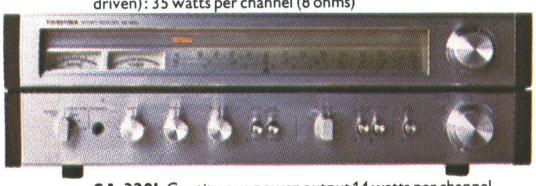
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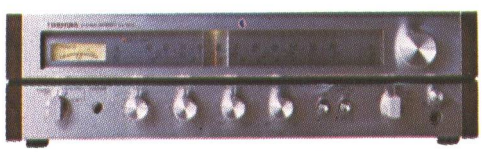
SA-520 Continuous power output 30 watts per channel, min. RMS, at 8 ohms both channels driven, with no more than 0.4% total harmonic distortion, from 20 Hz to 20,000 Hz.
Continuous power output at 1,000 Hz (both channels driven): 35 watts per channel (8 ohms)



SA-420 Continuous power output 20 watts per channel, min. RMS, at 8 ohms, both channels driven, with no more than 0.4% total harmonic distortion, from 20 Hz to 20,000 Hz.
Continuous power output at 1,000 Hz (both channels driven): 25 watts per channel (8 ohms)



SA-320L Continuous power output 14 watts per channel, min. RMS, at 8 ohms, both channels driven, with no more than 0.8% total harmonic distortion, from 20 Hz to 20,000 Hz.
Continuous power output at 1,000 Hz (both channels driven): 15 watts per channel (8 ohms)



SA-220L Continuous power output 7 watts per channel, min. RMS, at 8 ohms, both channels driven, with no more than 0.8% total harmonic distortion, from 40 Hz to 20,000 Hz.
Continuous power output at 1,000 Hz (both channels driven): 11 watts per channel (8 ohms)

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If you're choosing a front shouldn't you choose the most





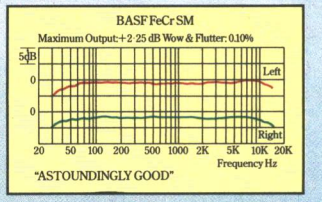
loader for convenience convenient front loader?



The Aiwa AD 6500 is unarguably the world's most convenient front loader. It's the only one with our automatic motor drive system for no nonsense precision tape loading.

You simply lay the cassette onto the horizontal carrier, close the cover and it is automatically transported inside the machine, and then inclined at an optimum playing angle of 30°.

It's a procedure that not only gives extra protection to your cassettes, but it ensures optimum performance. As you can see from this frequency response graph. Angus McKenzie called the overall result "astoundingly good."



This performance combines with a signal to noise ratio of 62dB (FeCr tape, Dolby on), two stage peak level indicator lights, independent three step bias and equalisation switching, and Aiwa's patented quick cue and review system.

You can understand the following comment from Dennis Killick writing in 'Cassettes and Cartridges': "The Aiwa AD 6500 is not merely the best front loading machine we've examined to date, but it's amongst the best cassette recorders of any kind we've either measured or used."

Our more compact front loader, the AD 6300, shares most of the features of its larger brother. Though instead of the automatic motor drive tape loading system, it uses Aiwa's patented oil-damped cassette ejection mechanism.

This makes cassette handling easier for you and safer for the cassette.

The starting price for the Aiwa front loader range is around £159 for the AD 6300.

Which demonstrates that it's not just our decks that are convenient, but so is our price.

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The truth, loud and clear.

*The 3400 receiver from the new Leak 3000 series: 3200, 3400.

It is the aim of every manufacturer of stereo receivers to minimise the drift between channels, at the same time keeping amplification both accurate and strong.

Using advanced digital circuitry (more usually found in computers) we have attained a remarkable new consistency of sound reproduction.

The results are the new Leak 3000 receivers.

They are robust in construction, elegant in design, and precisely engineered in every detail, even down to the unusually smooth control action.

Their performance achievement is an ability to reproduce any sound to be virtually indistinguishable from the original—whether it be an FM signal before transmission, or the subtle qualities of your finest records.

This has been achieved by the combination of the most stringent quality control with comprehensive specifications, in keeping with the Leak tradition.

In the tuner, we have dispensed with electrical coils and capacitors which are prone to drift and ageing.

These have been replaced with the most advanced integrated circuits, including a phase lock loop circuit in digital form.

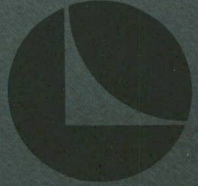
In the amplifier, the noise level has been so reduced that even in headphone listening background sound is minimal.

This, combined with a split power supply generous enough to handle even major musical peaks on both channels without clipping the sound means that you will hear a dramatic difference.

The Leak receivers have an unusual "sweetness" and "spaciousness."

You will not listen *to* Leak receivers, but *through* them, directly to what is being transmitted.

They achieve a new truth in sound reproduction.



LEAK

We promise to be true.

Rank Hi Fi, P.O. Box 70, Great West Road, Brentford, Middlesex, TW8 9HR.



What you hear now will be the truth.

The 3050 speakers from the new Leak 3000 Series: 3020, 3030, 3050, 3080.

There are four significant kinds of distortion in speakers. Using a unique simulation technique we have been able to reduce all four to remarkable new levels.

The result is the Leak 3000 series.

The technical details of this achievement cover twenty-five pages of close type and graphs. And as many years of experience.

Simply, we built a test device to generate these distortions. (If you're interested, they're *intermodulation, delayed resonance, Doppler,* and *time delay.*)

Each type was measured objectively, and our speaker specifications amended.

And then the results were measured not only by machines, but also by panels of listeners.

Ordinary men and women, some with highly trained ears, others more used to listening to transistor radios.

Their experience of hearing distortion was measured. And the design specifications again amended.

These measurement techniques are unique. As are their results. Our tests show that to audio engineers and untrained listeners alike, we have attained new standards of accuracy.

Each type of distortion has been reduced, one by one. Even the minor, but audible: *time delay.*

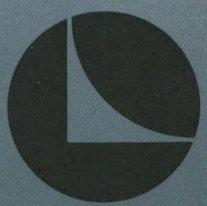
In conventional speaker cabinets, the sources of sound are at different distances from the listener.

With the precision-designed stepped baffle of the new Leak series, the bass driver is in exactly the same plane as the treble.

The progressive reduction of every audible distortion means that you will hear a dramatic difference. Greater depth, spatial effect and transparency of sound.

You will not listen to Leak speakers, but *through* them, directly to the music.

They achieve a new truth in sound reproduction.



LEAK

We promise to be true.

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FIVE NEW GARRARDS TO CHOOSE FROM. IT WON'T BE EASY.

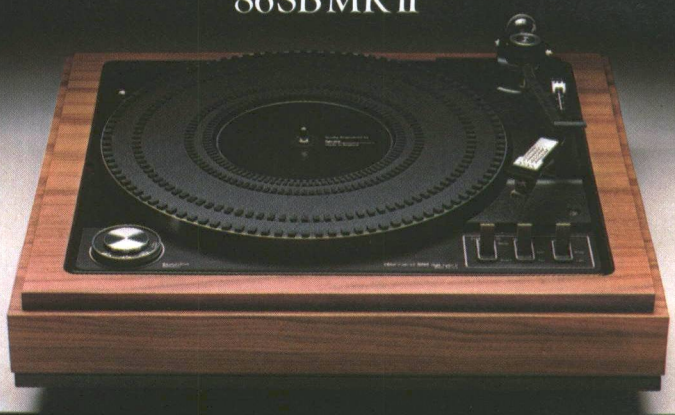
DD75



GT55P



86SB MK II



125SB



SP25 MK IV



Garrard have just launched two completely new decks – and made exciting stylistic improvements to the other three in the range.

The new DD75 is powered by a superb direct drive motor; it features electronic stop/lift control and illuminated stroboscope.

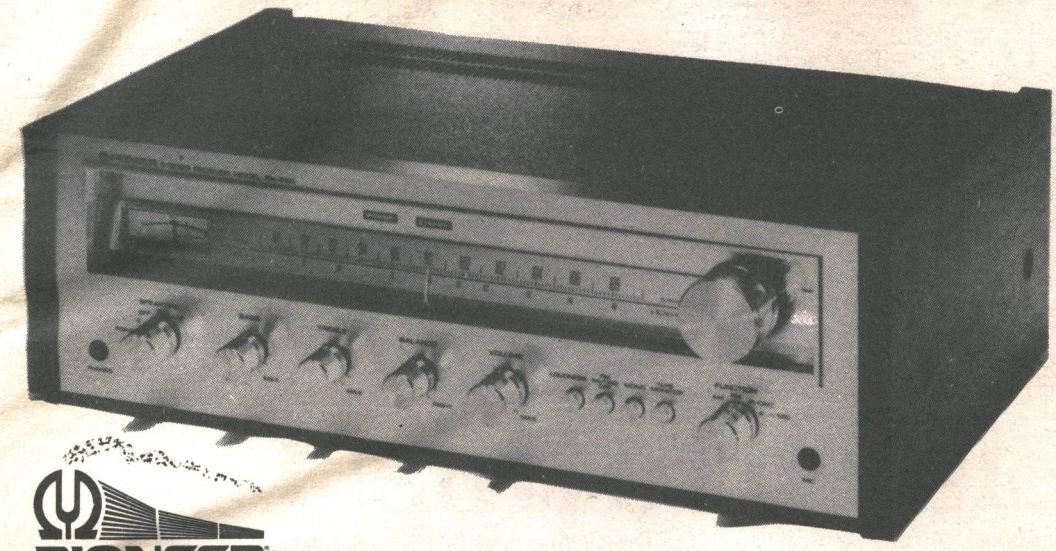
The new GT55P has zero tracking die-cast magnesium alloy arm, heavy die-cast turntable and illuminated stroboscope.

All decks are now set in a wooden base with perspex cover.

Precision is built in at every level; at their price technically ahead of any in the field.

Garrard
A PLESSEY COMPANY
precision at the heart of Hi-fi

NEWS NEWS NEWS NEWS



PIONEER EXPRESS

The very fact that Pioneer-cum-Shriro can claim to be running the biggest promotional exhibition on the British Rail network with the 'Pioneer Express' is some clue to the extent of this range of hi-fi equipment. First glance at the list of new equipment shows that the catalogues have been turned upside down, especially at the cheaper end.

Most notable is the demise of the world-renowned PL12D, which has had about a six-year run of amazing success. Naturally it has a successor — close in number as the PL-112D — which obviously is intended to have all the features of the 12D, plus others. Certainly its styling is 'polished', and the technical data offered to us quote a wow and flutter not exceeding 0·07% (WRMS), with a signal-to-noise ratio of better than 63dB (DIN B).

The PL15D has been updated into the PL115D, and Pioneer also have a PL117D, which is fully auto-capable. Its technical specification is the same as the PL112D, but naturally is a far more complex animal.

Receivers have suffered — in the nicest possible way — a complete revamp. The range begins with the SX300, but the most interesting starter in our hi-fi eyes is the SX-450 which is a 15 watts per channel tuner-amp, specified across the frequency spectrum at no more than 0·5% THD or IM distortion. All facilities regarded as basic these days are incorporated, such as switching for two speakers, tape socketry, loudness, FM muting and a mic input. Tuner specification is relatively advanced.

From there on up we have the SX-550, rated at 20 watts per channel and having two tape connections. The 35-watt SX-650 includes metering for both signal strength and tuning, more sophisticated electronics, and filters. The SX-750 claims special tonally-orientated electronic design, plus a 50-watt rating and tape duplicating switchery. The panel of the SX-850 suddenly becomes far more complex with switchable tone control turnover points, two phono inputs, MPX noise filter and lots of coloured dial lights. Power rating is 65 watts per channel. The numbers get higher and so does the complexity of electronics, with the SX-950 rated up to 85 watts per channel, plus switching for three speakers. The SX-1250 is the largest receiver capable of delivering 160 watts into 8 ohms. Top Pioneer design goes into this one, but the panel changes little from the SX-950. There is, however, the addition of multipath reception checking, and a calibrated volume control.

The cassette recorder line-up bears two additions — the CT-F7070 and the CT-F8080. Both are front-loaders, the first having Dolby — of course — auto-chrome detection, memory stop, input and output level controls with friction gangs for balance adjustment. The CT-F8080 has the added advantage of separate bias and equalisation switching.

****

Recording tape is being manufactured in Carraroe, County Galway, Eire, for Contek Magnetics. Production capacity is initially 15 million blank cassettes per year, plus 5in., 5½in. and 7in. reel-to-reel tapes. To reduce costs, fully automated plant is being used at all stages. Total staff number is 160.

****

Plus Series is a new line in tape from Ampex. The philosophy is intended to be competitively priced tapes for the serious recording customer. Plus series cassette, cartridge and reel-to-reel will be available.

****

Beab are moving ahead with safety tests on hi-fi equipment. So far we have had music centres, portable radio cassette recorders, receivers, stereo record players and stereo cassette decks analysed, and the latest additions are record turntables. Manufacturers included are Amstrad, Garrard, Hitachi, JVC, National Panasonic, Shriro (Pioneer), Skantic, Sony, Strathearn, Toshiba and Sansui. This encompasses 22 turntables.

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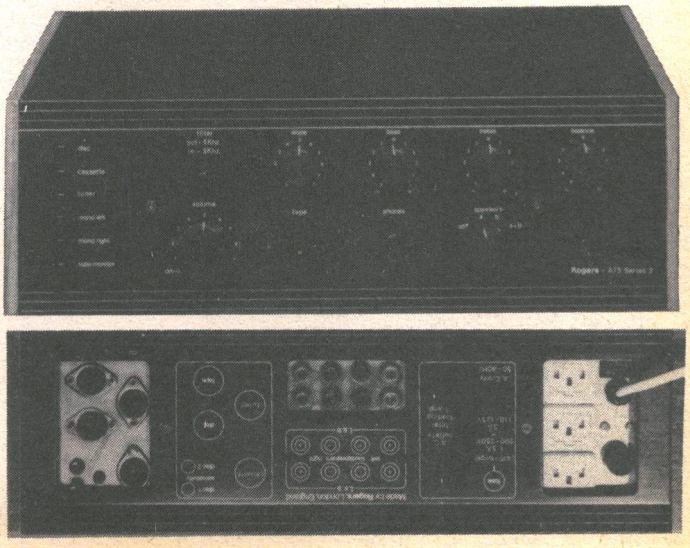
On Sunday, October 24, between 10am and 6pm in the Polygon Hotel, Southampton there is to be a hi-fi exhibition. It is being organised by Hampshire Audio of Chandlers Ford, who will with assistance of the distributors exhibit Acoustic Research, Nakamichi, Teac, Technics, Trio and Yamaha. In a special demonstration room systems based on each manufacturer's equipment will be played through several different pairs of loudspeakers.

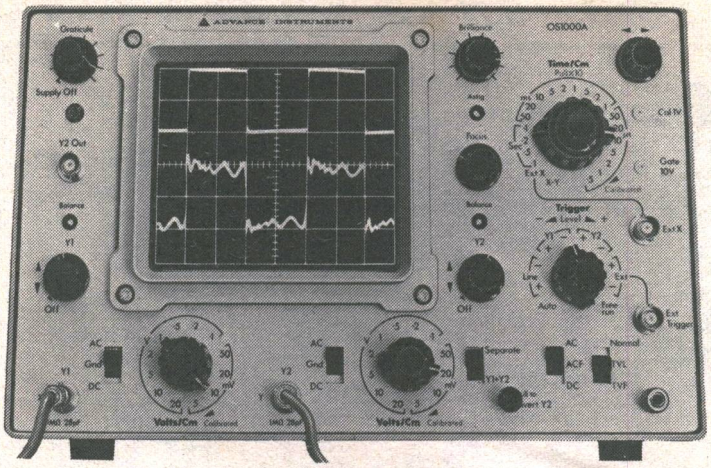
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Rogers take a strong line with Britain

With so much Japanese equipment on the hi-fi market it is nice to know that British hi-fi is not dead after all. We may hold the market as far as speaker manufacturers go but our electronic side of things has been looking a little bit sorry for itself. It's nice to know therefore that at least one British manufacturer has been able to make an impact on the Japanese market. Rogers, part of the Swisstone Electronics Group, have for the last few months been exporting most of their production of amplifiers overseas, mainly to Japan. They now feel though that the time has come to encourage other manufacturers to reduce the promotion of foreign equipment by supplying high quality equipment from home.

The Rogers A75 MkII amplifier is a typical example of the kind equipment we should have more of. At 45watts per channel into 8 ohms with a THD of less than 0·08% at 1kHz, any power up to 40W, 8 ohm loaded, the rest of the specifications are equally impressive. Inputs are provided for tuner, cassette, tape and either magnetic or ceramic cartridge. Outputs are available to feed cassette deck, tape deck, phones and speakers (either A, B or A+B). Speaker output can be switched out completely to supply phones only. Bass, treble and volume controls are present as well as low and high pass filters.

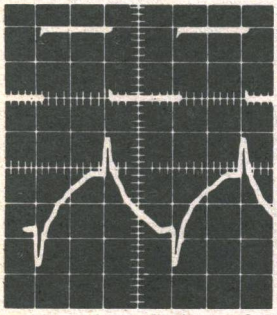




Listen to this!

This is an oscillograph of a square wave signal AFTER it has been through one of our linear-phase loudspeakers. You can see at a glance that the waveform is clean and almost perfect — and that should be enough to convince you that the speaker on test is worth listening to.

Most modern loudspeakers have a wide frequency response and are virtually free of harmonic distortion, but how many of them can do this kind of justice to a square wave? Chances are that if yours were put to the same test, the oscillograph would look like this — a typical 'good quality' loudspeaker trace.



The degradation of the square wave input is caused by phase distortion in the loudspeaker. And what you see on the screen you also hear in normal musical reproduction.

What is phase distortion?

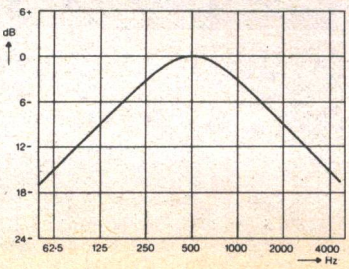
It is a distortion in time — a delay between different sections of the frequency spectrum. It occurs in any multi-unit speaker and is caused by the phase changes which develop in the crossover networks. As it is in the nature of a capacitance to advance the current in relation to the voltage, and in the nature of an inductance to delay it, the capacitor-dominated circuit which filters the high frequencies to the treble driver will advance the waveform by 180° in relation to that of the lower frequencies which are filtered by an inductance-dominated circuit to the bass driver. The audible effect thus created is that the music seems to stay 'inside the box'; it lacks presence and definition and the individual instruments are difficult to locate. A simple method of equalising this time-lag would be to reverse the polarity of one of the drivers, but of course this creates an audible drop in amplitude at the crossover frequency through the mutual cancellation of the two units. It is therefore not a viable solution.

How did Bang & Olufsen overcome phase distortion?

When the causes of phase distortion originate in the natural laws of physics, how is it possible that Bang & Olufsen has found a way to eliminate it? Obviously we couldn't change nature, so we spent four years trying to minimise its effect.

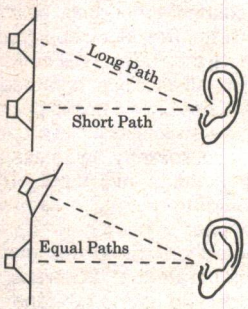
The concept of phase-linearity in speakers is not new, but all previous designs involved the use of complex active components so the resulting products were so costly that only professional recordists and studios could afford them. Our aim was to produce a domesticated loudspeaker that would match this phase-linear performance but still remain within reach of every audio enthusiast.

First we had to invent methods for identifying and measuring phase distortion. Once we could differentiate between this and all the other types of distortion and imperfection inherent in loudspeaker design, we set about reducing the whole problem to mathematical terms. With the help of our NASA computer terminal, we discovered that the phenomenon called phase distortion was directly related to a 'missing factor', and this factor had a value exactly equivalent to a drive unit with a peak at the crossover frequency and attenuated 6dB/Oct on both sides of this frequency. In other words, we needed to add a 'filler-driver' whose performance characteristics would look like this.



The addition of this filler-driver (registered by Bang & Olufsen under the name Phase-Link®) plus a completely re-designed crossover network and some physical rearrangement of the conventional drive units, resulted in the first Beovox Uni-Phase loudspeaker.

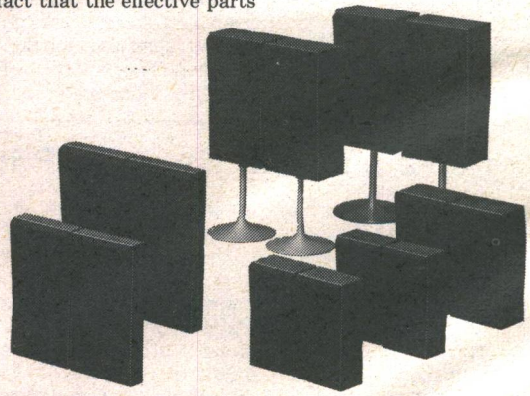
Why do Beovox Uni-Phase loudspeakers look the way they do?



There is a further reason why the bass tones tend to be delayed in relation to the high ones. This is a delay in arrival time caused by the simple fact that the effective parts of the deeply-dished woofer are usually farther away from the listener's ear than those of the small, shallow tweeter. We have minimised this problem by mounting the units on an inclined vertical plane so that they share a common acoustical axis and have equal paths to the ear.

That's why Beovox Uni-Phase speakers have an angled front profile. The cabinets are made of a high density polyurethane foam resin which has better acoustic properties than wood, so we have been able to maintain a wide frequency range and good transient response while reducing the physical size of the enclosures.

There are seven models to choose from. Power handling ranges from 22 to 70 watts RMS and impedance is 4-8ohms throughout. So most high quality systems can now enjoy the advantage of phase-linear speakers which cost no more than conventional ones. All authorised Bang & Olufsen dealers offer comparative demonstrations — so if our oscillographs haven't fully convinced you, let your own ears furnish the proof.



Bang & Olufsen -we think differently

Please send me details of Beovox loudspeakers and a list of stockists.
Bang & Olufsen U.K. Limited, Eastbrook Road, Gloucester, GL4 7DE
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NEWS NEWS NEWS NEWS

New Lux turntables offer versatility over arm choice

Howland West have added two new models to their range of Lux turntables, the PD121 and the PD282. The 121 is externally the same as the existing PD131, but incorporates a larger motor unit and a heavier platter. Neither model comes supplied with a tonearm, but can easily be fitted with any arm of your choice using a simple bayonet fitting, rather like a camera lens. The 121 is fitted with a mirror strobe to indicate correct running speed. The motor is a brushless DC Servo motor supplying the direct drive. RRP is £370 + VAT.

The PD282 is also a direct drive unit, but this comes complete with its own tonearm. This is a S-curve static balance type, designed with low bearing friction. A pick-up cartridge can be fitted on request and this the Audio Technica VM, tracking at 2·5g. The turntable is two speed, and RRP is £145 + VAT.



More than just for browsers

It is probably well known that RS Components are in the forefront in supplying electronic components to industry and the professional world generally. Access by the DIY amateur has not been easy. However for a couple of years now a sister company in the electrocomponent group has been providing a retail outlet. This company is Doram Electronics Ltd, PO Box TR8, Wellington Road, Industrial Estate, Wellington Bridge, Leeds LS12 2UF. In edition 2 of their catalogue, now available, the range is extended and they are into the kit business based on magazine articles. This latter activity is due to be expanded shortly. Doram's catalogue, entitled 'The doorway to amateur electronics' is available at 60p post paid, cash with order, from the above address.

Canned puff



A can of gas – compressed – for cleaning electronic equipment. Pelling & Cross Ltd, 104 Baker Street, London, W1 can supply this inert gas which also doubles as a freezing liquid if the can is inverted. Price of a complete kit for service engineers is £8.75.

Value in print

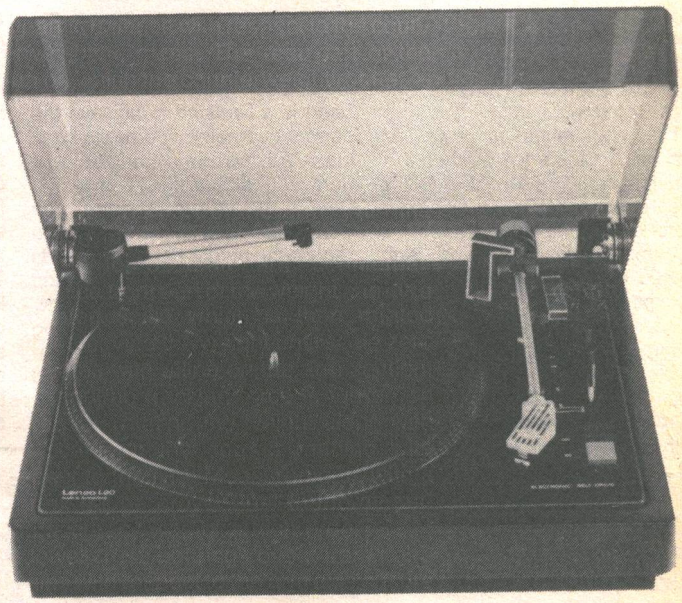
Alas we realise that our latest price increase — by 5p — is sad news for you, and naturally we hope that this will not discourage you from buying any more copies. Of course we can give you every assurance that value for money is at least one of our objects, but perhaps we can suggest that you look at it another way: look at our cover price, and check the cost of a pad of plain paper of similar number of sheets. Our information tells us that it would cost about double!

Goldring show off new Lenco turntables

Goldring have introduced a new range of their Lenco turntables. They are all belt driven and range from a purely manual version, the L80 through the L82 which is semi automatic to the fully automatic L84. There is also the L90, featuring illuminated stroboscope, electronically controlled speed adjustment and shut-off mechanism. A new ultra-lightweight arm is fitted as can be seen in the photograph. The L80, 82, and 84 all feature a new S-band arm.

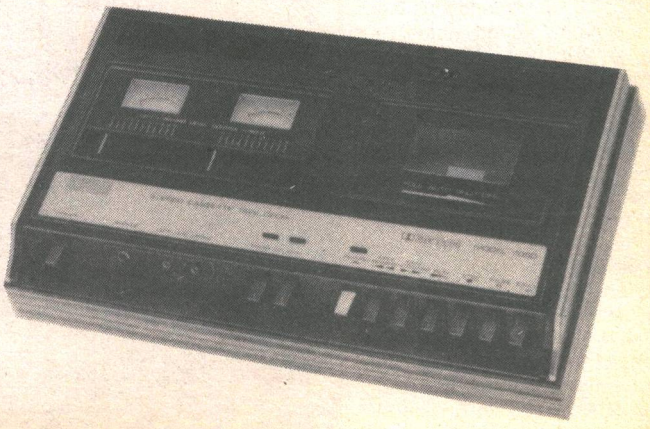
Lenco have also introduced the L3000 music centre, which comprises an AM/FM stereo tuner, belt driven turntable, stereo cassette deck and an amplifier.

Goldring's range of cartridges have also been added to with the G900SE Micro Mass cartridge. Weighing less than 5 grammes, this cartridge is capable of tracking at less than 1 gramme.

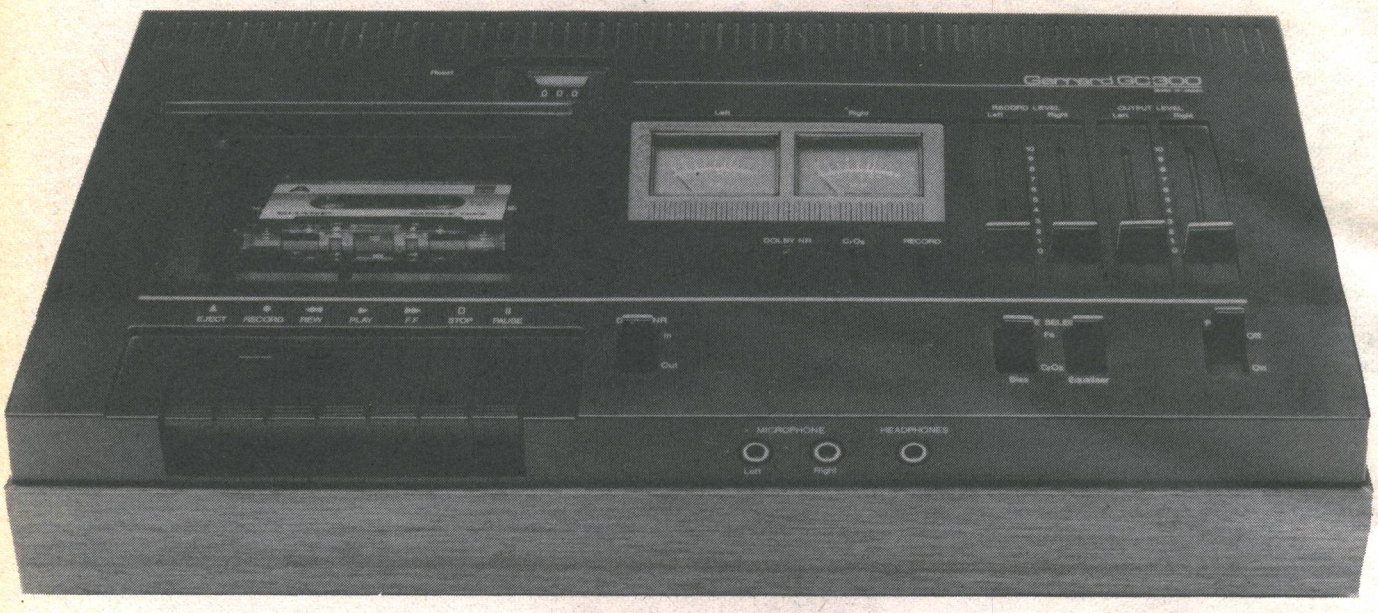


Amstrad move up in cassettes

Amstrad are replacing their model 1000 cassette deck with a new version, the 1050 Dolby model. Styled along the usual Amstrad lines the technical specifications quoted are an improvement on the old model. Frequency response for ferric tape is 40Hz-11kHz and for chrome tape 40Hz-14kHz. Wow and flutter is at 0·1% with THD at less than 0·8%. The Dolby system incorporated gives a noise reduction of 10dB on the signal to noise ratio. The only thing we don't know is the price.



NEWS NEWS NEWS NEWS



Garrard diversify — and take no chances with the future of hi-fi

The name of the game nowadays appears to be restyle and launch anew in order to remain afloat. Evidence of this is the massive purge on products in the Garrard range, for there is suddenly a much enlarged and prettier product line from Swindon.

The most intriguing news lies with the turntable featured on this month's front cover: the DD75 direct-drive. A DC direct-drive motor of oriental original rotates a diecast aluminium platter, with quoted rumble of −70dB DIN B weighted and a wow and flutter (peak slow weighted) of 0·06%. Pickup arm is S-shaped and stated to be low-mass, with a tracking force capability of 0.75g. Pivots are combination jewel and ball-bearing. Auto arm lift and motor cut-out are incorporated. The base is finished with natural teak.

Another new turntable is the GT55P, which perpetuates the tangential-tracking concept first introduced in the Zero 100. The head is articulated to achieve the correct geometry. In order to keep mass low, the arm is manufactured from magnesium alloy. The deck is fully automatic, and the mechanism is simplified in order to reduce the number of moving parts in interests of reliability and economy Speed variation of ±3%, a stroboscope, variable cueing rate and magnetic bias compensation are all featured. Rumble is quoted at −63dB DIN B weighted, and wow and flutter 0·1%.

The remainder of the decks, the 86SB Mk II, 125SB and SP25 MkIV are all restyled with wooden plinths and tinted transparent hinged dust covers.

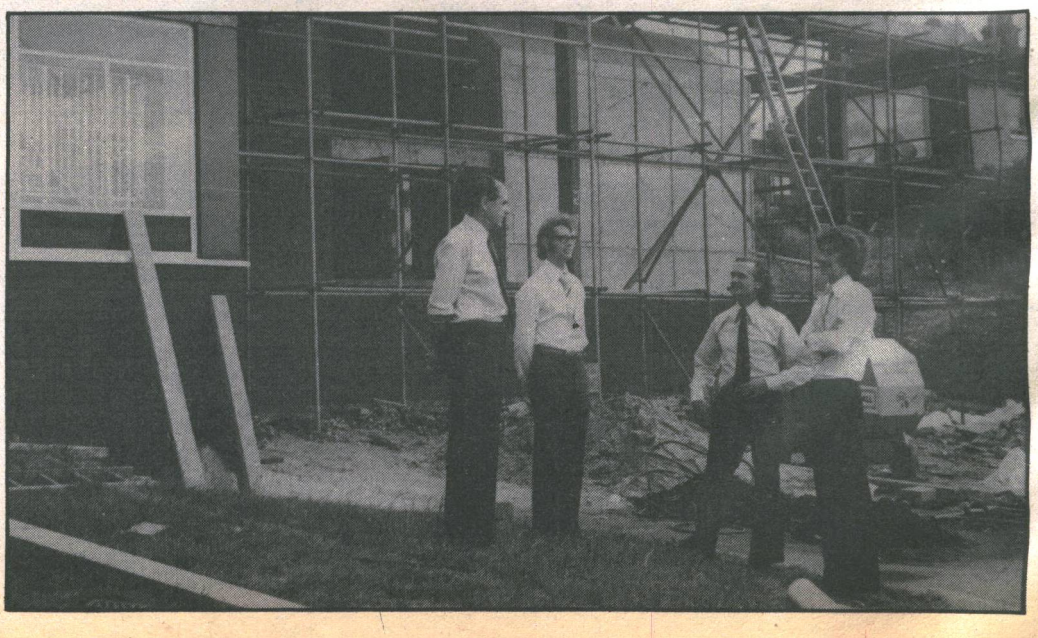
An important departure for Garrard, which indicates a move towards manufacture of hi-fi across-the-board, is the introduction of a cassette recorder. The GC300, as it is known, is a fully-fledged Dolby machine with full equalisation and bias switching, record and replay slider controls. The tape head is hardened permalloy, and is made accessible for cleaning. Wow and flutter is rated at ±0·12% linear RMS playback, and 0·2% record/playback. Distortion is simply stated as 0·8% chrome and 0·6% ferric, presumably at 0VU.

The final, but nevertheless very interesting device is a music centre, the GA-150. In one neat package comes a three-band tuner, a record deck, a cassette deck, a 2 x 20watts (musicpower-note) amplifier and separately a pair of loudspeakers. The tuner has internal aerials for medium-wave, long-wave and VHF, but there are, of course, sockets for external aerials. The amplifier has all normal controls, plus facility for ambiophonic sound — sockets being provided for rear speakers. A 5-pin DIN socket is also provided for an external tape recorder. The cassette department caters for ferric and chrome tape, has auto-stop and automatic level control.

Rank-Leak-Wharfedale move complete anechoic chamber into new rumble-free shell

Almost completed is the transfer of the Wharfedale anechoic chamber from the Bradford Road branch to Briggs House, Bradford. Supported by special foundations that isolate it from ground vibrations down to 2Hz, the shell of the chamber gives excellent immunity from factory and road noise. Access is at first floor level with a lift to lower speakers on test into the mouth of the chamber. Downstairs space is taken up with a laser room for holography, and a darkroom, as well as other measurement facilities.

The photograph shows (l to r) Ken Russell (Technical Manager), Gordon Hathaway (Chief Design Engineer, Electronics), Peter Fryer (Measurement Engineer) and Alex, Garner (Senior Project Engineer) standing in front of the new annexe.



NEWS NEWS NEWS NEWS

National Panasonic are into music centres in big way

You may already have seen National Panasonic's new range of hi-fi equipment on sale in the shops. It has been available since September, and is designed mainly for the first time buyers, as it allows a reasonably good system to be assembled for relatively low cost. The new range offers a complete choice of 'separates' — a tuner, an amplifier, a stereo receiver, a turntable, two loudspeaker models, a combined receiver and cassette deck unit, and National Panasonic's first Dolby music centre. All units have the same black panels and rosewood finish designed to blend in with any home decor. Brief specifications and prices of the units are as follows:

Separates

ST2300 stereo tuner. FM/AM. £64.95

SU2300 amplifier. 20watts per channel. £64.95

SL18 turntable. Semi-automatic belt driven, complete with cartridge. £69.95

SB60 loudspeaker. Single drive unit, bass reflex. £49.95 per pair.

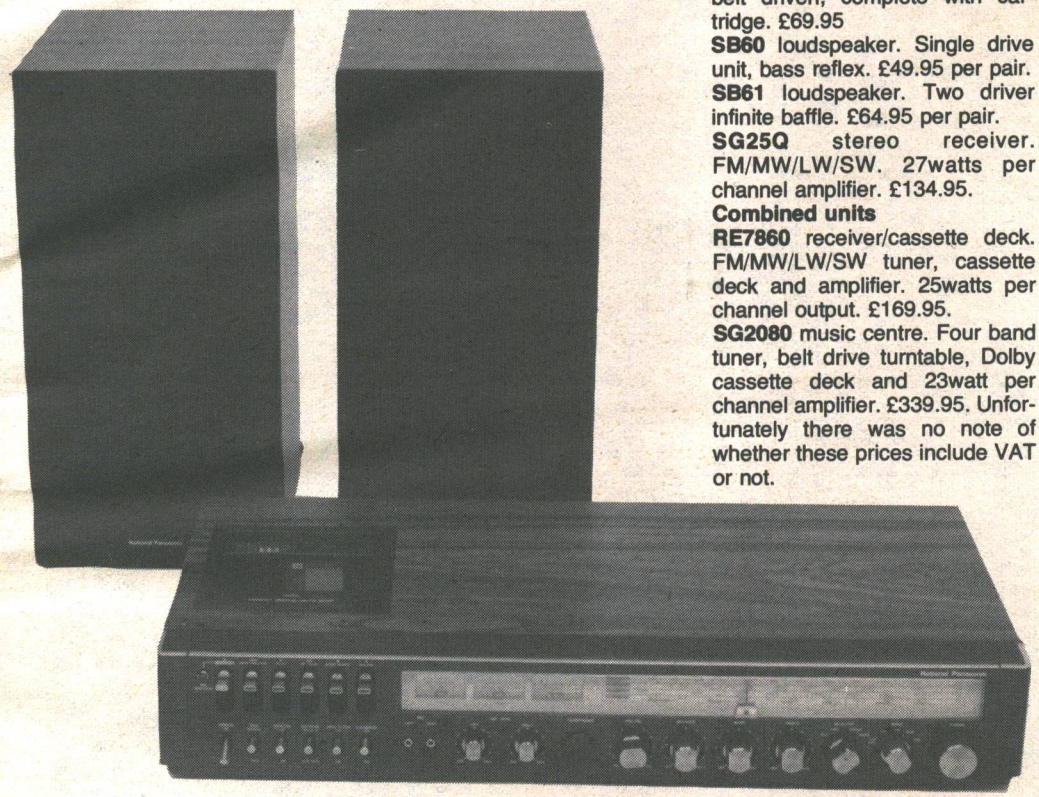
SB61 loudspeaker. Two driver infinite baffle. £64.95 per pair.

SG25Q stereo receiver. FM/MW/LW/SW. 27watts per channel amplifier. £134.95.

Combined units

RE7860 receiver/cassette deck. FM/MW/LW/SW tuner, cassette deck and amplifier. 25watts per channel output. £169.95.

SG2080 music centre. Four band tuner, belt drive turntable, Dolby cassette deck and 23watt per channel amplifier. £339.95. Unfortunately there was no note of whether these prices include VAT or not.





Hot phones

A cordless headphone — legal because it conveys speech by infra-red (not radio) radiation. It is made by Nordmende, and available through Vessco Vision & Radio Ltd, Unit 4 Blackwater Way, Ash Road, Aldershot, GU12 4DL.

Tips on tape

The first of what I'm sure will be many press releases reminding us that Christmas is creeping up on us has been received from Memorex. They felt they would like to remind us that the Memorex range of cassettes and accessories would make ideal gifts for any hi-fi enthusiast. Blank cassettes range in price from £1.08 for the C-30 to around £1.64 for the C-90. All Memorex tapes carry a five year guarantee.

Accessories include a Cassette Head Cleaning Kit at 94p, and the full Cassette Cleaning Kit for £1.43. The Memorex Storage Library is available at £1.65.

★★★★★★★★★★★★★★★★

Now that the Telefi TV sound adaptor is dead, anyone wishing to run TV sound into his hi-fi system may wonder how to go about the problem. There remains in existence, however, a company named Motion Electronics Ltd, Addlestead Farm, Tonbridge Road, East Peckham, Kent, who manufacture special tuners including types for reception of VHF and/or UHF TV sound.

★★★★★★★★★★★★★★★★

Bib have told us of three new accessories: One is a complete Musicentre Care Kit, containing a Groov-Kleen, cleaning brush, stylus cleaner, record dust-off, tape head cleaner, re-record tabs and extractor, and title labels. Price is £4.80. There is also a popular cassette care kit with cassette tray, hand winder, title labels and tape head cleaner. Price £2.81. Finally there is a new cassette editing and splicing kit with a special splicing block. Price is £1.98.

★★★★★★★★★★★★★★★★

★★★★★★★★★★★★★★★★

Hitachi have lately expanded their range, and produced a colour brochure to describe everything. Information can be sought from Hitachi Sales (UK) Ltd, Hitachi House, Station Road, Hayes, Middlesex, UB3 4DR.

★★★★★★★★★★★★★★★★

Falcon Electronics, 26 Station Road, Bexhill-on-Sea, Sussex, TN40 1RG, whose main business is supply of components and design consultancy for loudspeakers, now have rights of supply of Audax loudspeakers and enclosures. Quality components for all areas of the audible spectrum are imported.

★★★★★★★★★★★★★★★★

Sansui are proudly announcing that not only is the QS Variomatrix circuit is being published for the first time – in Wireless World – but that kits are being produced by Compcor Electronics, 9 Dell Way, St. Stephen's Road, London, W13 8JH.

★★★★★★★★★★★★★★★★

Cassettes and records can live together in perfect harmony

I suppose it's a good thing that so many records and cassettes are released onto the market, otherwise manufacturers of storage units would have to think of something else to make. Yet another unit is now available called (would you believe?) Tape 'n Disc Rax. The thing that makes *this* one unique is the fact that it is a dual storage system for cassette tapes and single records on the same stand. It will hold 32 cassettes and about 60 7in. records, but can be extended by add-on units to hold up to 64 cassettes. Price is around £7.70, and it should be on sale in most record shops.



Dual

FIRST FOR TECHNICAL PERFECTION

effortless automatic performance

DUAL turntables can give you the finest in technology and precision engineering for the exacting standard of performance you demand. The trouble is which do you choose?

TAKE THE CS510. It's a medium priced manual, single-play turntable which positively demonstrates DUAL technology throughout. Forgetting the whys and wherefores of manual v automatic there is just that touch of the automatic about the 510 where you need it. A mechanical sensor tells you when the tonearm is lined up precisely over the lead-in groove. When the record finishes the tonearm is lifted by cue-control and the motor shuts off . . . automatically.

The 510 is belt driven. A simple system which filters out motor vibration. Features include: 8-pole synchronous motor. 12" dynamically balanced 2 speed platter with inbuilt gear cut Strobe. Viscous-damped cue-control. Pitch control. Multi-scale anti-skate Low mass gimbal tonearm and Shure M95D cartridge. Weighted rumble according to DIN 45 500 is better than —63dB. Wow and flutter is better than 0.08% according to DIN 45 507. All in all a turntable for every season. Just what you'd expect from DUAL. Technical perfection and precision performance.

NOW THE CS601 takes you into new realms. Still belt driven, but fully automatic. The high-torque 8-pole synchronous motor drives a 4.5 pound two-part dynamically balanced platter. The motor's constant speed, smoothness and isolation from the platter reduces the level of rumble, wow and flutter to insignificance. Rumble is better than —63dB, DIN weighted. Wow and flutter is better than 0.08%. The tonearm is mounted in a double gimbal for unprecendented accuracy of tracking and the V15 Mark III cartridge is supplied. Variable pitch control is provided for both speeds and an illuminated strobe is built into the chassis. The anti-skating system has separate calibration for conical, elliptical and Shibata styli.

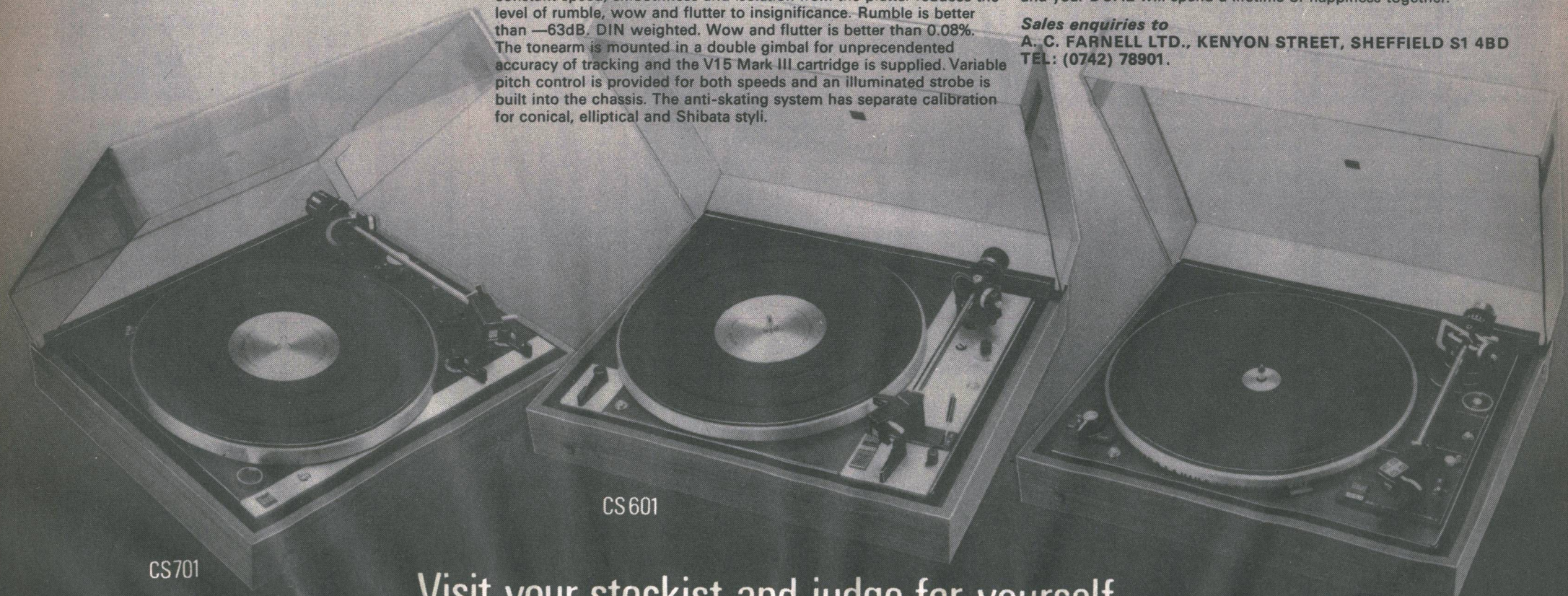
The 601 incorporates a number of the features of the 510 but adds some innovations all its own to create one of the finest automatic turntables available at a reasonable cost.

THE CS701 has achieved world acclaim. The direct drive system brings a unique quality. Rumble is inaudible – better than —70dB weighted. Wow and flutter is virtually eliminated, better than ±03%, by the fitment of two sets of overlapping field coils that provide a totally gapless magnetic field. This eliminates the successive pulses common to all other motor designs. The all-electronic, brushless, 32-coil motor has Hall-effect feedback control and is energised by a regulated power supply. The tonearm is balanced by unique anti-resonance filters and the V15 Mark III cartridge is supplied. The DUAL 701 is simply the closest to technical perfection available in a turntable: automatically!

What's your choice? Of course there's all the literature to read – we've only touched the surface here. You'll find all that at your DUAL stockists and a demonstration too. If you're not sure who your nearest stockist is you can always write direct to us. By the way, of the DUAL range available in the U.K., there are other models not shown here, starting at less than £90.00.

DUAL have 75 years of technical achievement behind them.
So visit your stockist and whatever you finally decide we are sure you and your DUAL will spend a lifetime of happiness together.

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Visit your stockist and judge for yourself...

Letters

Dear Sir

I have been moved to write this letter for two reasons — first as a compliment and secondly to air my views on some unjust recent criticism of cassettes.

Thanks for a good magazine. Your record reviews are useful (I'd be lucky to see a mention of Omega's new album in Melody Maker!), your synthesiser series was an original piece of work in a very exciting field, and finally your recent article on cassette tapes was excellent — a long overdue and highly useful survey. All I can suggest is more on cassettes, synthesisers and heavy/progressive rock album reviews. I feel you came down a little hard on TDK Dynamic in your survey, though. I bought some from a mail order discount house at 65p each and these give acceptable performance on my Sony deck which is optimised for Sony HF in Ferric position, although the latter are slightly better.

Moving on to my second subject I have read some correspondence suggesting that cassette decks should be avoided by the true hi-fi enthusiast when compared with discs. Apart from the ergonomics of handling cassettes, their convenience and robustness (no risk of destroying your prized collection when blotto) — they win on cost. Considering a small collection of 100 albums, this costs 40p per album to record on cassette of reasonable quality (say discount Sony HF) as opposed to £3 per album with disc. So at the century mark you save £260 by using cassette as opposed to disc — and it is easy enough to buy a state of the art deck with the common price of say £60 with a disc deck. After this, of course, you just save all the way with cassettes. Another very under-rated piece of equipment is the headphone — cheap, of comparable frequency response to speakers, making the most of stereo recording (ie binaural) and most important you can use loudness in privacy. Why pay out £100 plus on speakers handling vast wattages if you use only a loudness of 90dB?

Yours sincerely,
B.D. Martin
Bristol.

Letters

Dear Sir,

I have been interested of late to see arguments of 'test results versus subjective listening evaluation'. Some equipment reviewers (and manufacturers) seem to rate products with the philosophy of 'the more zeros after the decimal point in the distortion figures the better'. More recently there is the opinion being expressed that some amplifiers 'sound better' than others whose test results may indicate the opposite. This is often translated into the terms 'musical' for the former and perhaps 'not so musical' for the latter. Interestingly enough also appearing are comments like 'sound like a good tube amplifier' indicating that the tube amplifier somehow sounded better than most recent transistor amplifiers which are often described as 'hard' or 'harsh' or even 'analytical'. A certain pre-amp power-amp combination recently was described by a certain reviewer as one of the most musical amplifiers he had heard.

All this really begs the question 'can musical quality (musicality?) of an amplifier be measured (determined), and/or is it related to the *way* in which an amplifier distorts? Does the combination of cartridge/tone arm and speakers in any way change this — ie can a 'musical' amplifier be made to sound non-musical and conversely can a 'non musical' amplifier be made to sound musical by these other components? (some form of incompatability of performance?). Here I don't mean adding cheap auxiliaries to an expensive amp — but is it not a fact that some pieces of equipment 'go better' together?

Are we really deceiving ourselves with the sounds better versus sounds right argument (can something sound better than something else if it doesn't sound right?).

Finally I would like to put up some further topics briefly for your consideration.

I. Bose (amongst other interesting ideas) claim that distortion below certain levels is inaudible and therefore academic as to whether it is 0·001 or 0·01%.

2. I have always thought that the timbre of a note was determined by the presence and the relative amplitude of harmonics of a fundamental note ie, a 10kHz note may have significant amounts of 30kHz and 50kHz which affects its timbre even though in themselves they would be inaudible to the human ear. Can this be detected if such a note is listened to on a speaker whose usable range extends only to 20kHz compared to another which may have usable response to 50kHz?

3. Is all this important if the source material has serious defects (and also the room itself?).

Is a 'hi-fi nut' someone who spends enormous sums of money to faithfully reproduce surface noises? Yours faithfully,
R. Alexander
Tasmania, Australia.

P.S. Really enjoy your articles comparing a number of similar items.

ADVICE

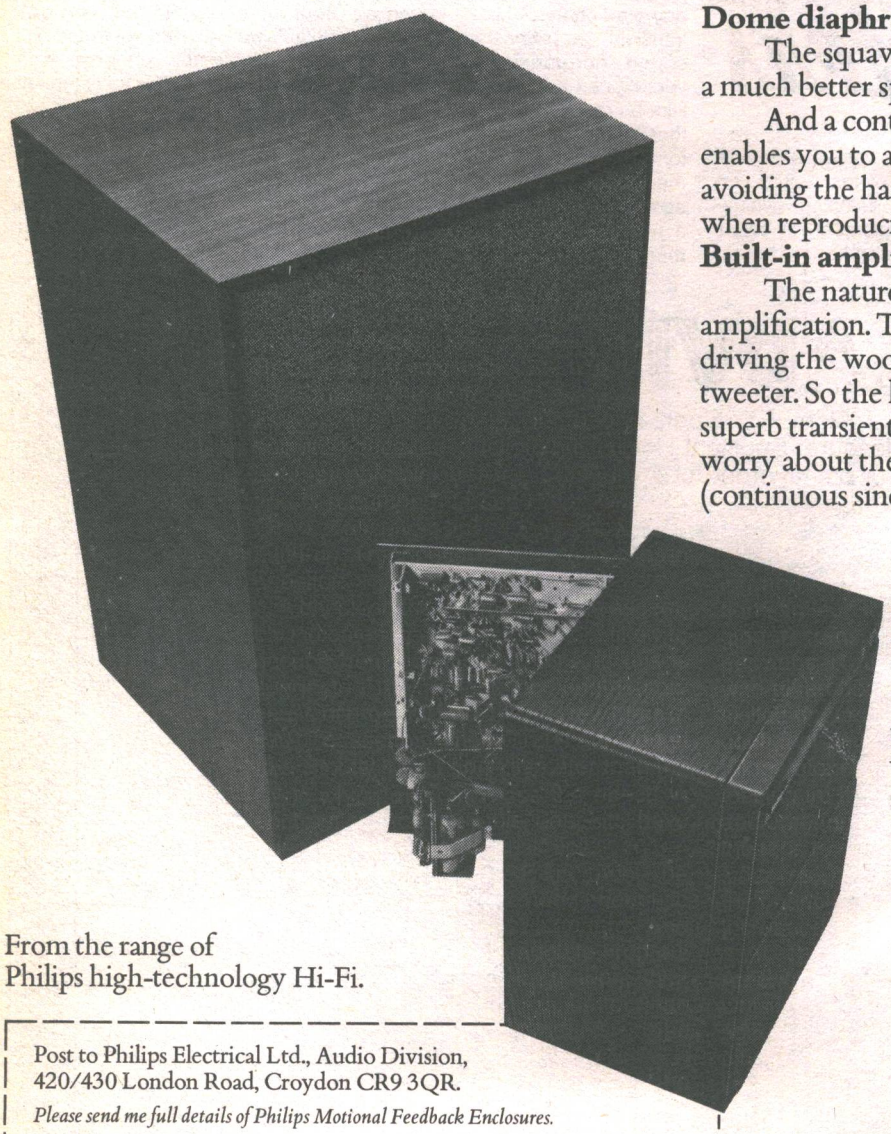
We can help you with your Hi-Fi problem. For a personal reply print your question below and post this form to 'Advice', Hi-Fi For Pleasure, Spotlight House, 1 Benwell Road, Holloway, London N7 7AX. Please enclose a cheque or postal order for £1, and a stamped, self-addressed envelope

PHILIPS

Philips prove brains beat brawn.

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You can try bigger and bigger enclosures. But you'll be far better off with a new idea developed by Philips. It ensures true bass response, in correct proportion to the rest of the tonal range. And reduces enclosures to a quarter of their previous size.



Philips Motional Feedback (MFB) System.

How does it work?

A solid-state electronic brain monitors the woofer cone and *instantly stifles the slightest tendency to vibrate incorrectly.*

The woofer can therefore only vibrate in strict accordance with the incoming signal.

It is virtually *incapable* of distorting the sound. Even in a small enclosure.

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The squawker and tweeter are domes, which give a much better spread of the frequencies they handle.

And a continuously variable treble roll-off filter enables you to adjust to the acoustics of your room, thus avoiding the harshness possible with other speakers when reproducing high tones.

Built-in amplifiers.

The nature of the MFB system demands built-in amplification. The RH544 has two amplifiers, one driving the woofer, the other for the squawker and tweeter. So the high-frequency amplifier can provide superb transient response because it doesn't have to worry about the low notes. The total output is 60 watts (continuous sine wave).

Philips MFB enclosures can be used with virtually any amp or pre-amp unit, such as the Philips RH551. Or as replacement speakers they will up-grade an existing system to 60 watts per channel.

Listen to the RH544 at one of our top audio dealers. The beautiful sound will tell you more than anything we can say. Brains really do beat brawn.

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A Lux PD131 direct-drive turntable
An Ortofon MC20 moving coil cartridge
An SME3009-II pickup arm

These three top-class components of a record-playing system have been assembled together by Howland-West Ltd to form a superb prize in this competition. And they are as easy to win as completing a crossword.

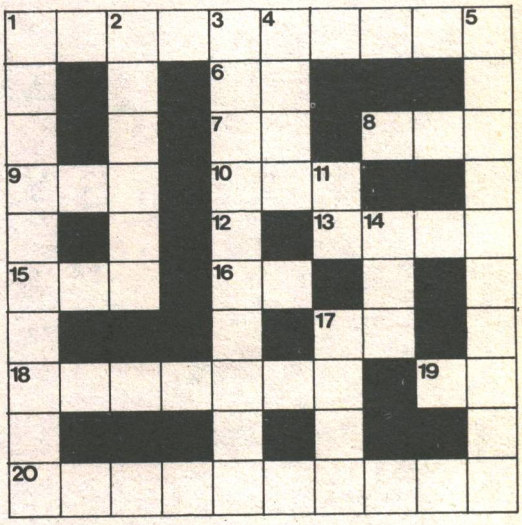
To enter, apply your mental powers to the clues below, and send the completed form to 'Lux Competition', Hi-Fi for Pleasure, PO Box 195, Spotlight House, 1 Benwell Road, London N7 7AX. Closing date is November 30, 1976. The Editor's decision is final in any case of dispute.

Clues across

1 Stylus support
6 Negative number
7 Short cartridge
8 Way above FM
9 Topical distortion
10 Four ways from the East
13 The only bump in a good tweeter
15 Entertainment in the cold
16 The Beeb's transmitters depend on it
17 Right at the bottom, but important
18 A likely reaction to this record problem
19 We try to keep it high
20 Testing out of the laboratory

Clues down

1 Dangerous, just for the record
2 A thorny point
3 Far removed from the output (5)
4 Sounds like a neighbourly problem
5 A hard surface to sound
11 Quadraphonic dimension
12 High, high, high
14 Switch of peace
17 It isn't right





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Modular, professional standard front loading stereo cassette tape deck in rugged matt-black metallic casing with 'Dolby' noise reduction system.

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High stability, 2 speed stereo, belt drive turntable with 4 pole synchronous motor.

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GARRARD DD75



by Gordon J. King

The DD75 is Garrard's first venture into direct-drive turntables, to keep pace with the times and keep their top-flight deck well up with competition. The motor itself is of Japanese origin, but all other parts appear to be of Garrard breeding

The DD75 is from the recent range of Garrard turntables and decks. It is, in fact, a complete deck with low mass arm, nicely styled plinth of genuine teak veneer finish, tinted transparent dust cover and Shure M75ED/II cartridge, which is compatible with the arm as will be shown. The turntable has a direct drive motor: multipole, brushless, running on DC and servo-controlled for long and short-term speed precision. Detailed tests of rumble and other spurious low-frequency noises were made in an endeavour to prove conclusively whether direct drive motors can be held responsible for replay aberrations resulting from pulse modulation by the motor — a point brought up recently in the hi-fi press.

The motor is switched on and off and speed changed (33⅓ and 45 rpm) by three press keys at the right-hand near corner of the motor board. The escutcheon relating to these keys caters also for the arm lifting/lowering lever and a pitch control, which regulates the speed of the motor a little either side of the nominal speed. At the opposite front corner of the motor board is another moulded plastics escutcheon which has a small window looking into an illuminated strobe. This accommodates the mains on/off press key.

The arm base fixing is also associated with a plastics moulding, which carries the arm lifting/lowering activitor and a small knob for adjusting the side-thrust compensating force to suit the tracking weight and stylus contours. This is roughly calibrated allowing an approximate setting to be established initially for either an elliptical or conical tip. It is possible to make further fine adjustments while a music or test record is actually playing.

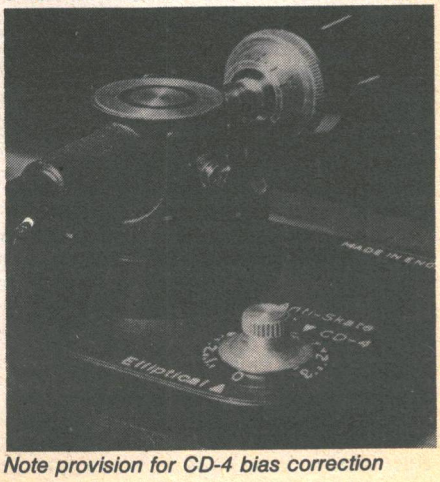
The motor spindle carries a well machined diecast aluminium turntable of about 4lb in weight. This is in excellent dynamic balance, essential for the lowest wow and flutter from a direct drive motive force, and is fitted with a castellated mat. Motor board decoupling is not adopted, but instead the deck as a whole is isolated from external vibration and acoustical feedback by well damped shock-resistant pads constituting the four feet. The strobe patterns (one for each speed) are printed on the underside of the turntable. They are neon illuminated and optically arranged so that the pattern corresponding to the set speed appears stationary through the viewing window when the pitch control is close to mid-scale. As shown by the test results, the control ranged from about 5% fast to 4% slow either side of centre.

The side play at the turntable edge was so small as to defy measurement; but there was up and down movement since the shaft rests normally on a thrust race.

The geometry of the arm is arranged to minimise tracking error, and from calculation it would appear that the maximum error which could be expected would be less than 2°. The least tracking error occurs at disc inner diameter when the cartridge is correctly adjusted in its holder. The arm is of 'S' shape, leading to good dynamic balance with respect to the counterweighting mass. The rear part of the arm on which the counterweight rotates is slightly offset from the main part axis and is decoupled.

The counterweight is clicked into position so that when it is rotated it moves along the end part of the arm. With the cartridge in position the weight is thus adjusted for accurate arm counterbalance. The front part of the weight carries a calibrated scale which is then rotated without moving the weight until scale zero correlates with a line on the arm section. The required tracking force is turned on merely by rotating the weight along with the scale for the correct reading with respect to the line. Measurements with a Correx gauge proved that the force setting accuracy was of a high order.

Jewel cross bearings offset from right-angles with respect to the arm axis ensure small vertical friction: this measurement



Note provision for CD-4 bias correction

put at less than 20mg. Maximum lateral friction was round 20mg depending on the load presented by the signal wires at the arm position measured. These are good values and unlikely to be greater on any sample. The effective mass of the arm would appear to be close to 16g. When the pickup runs into the playout groove of a record a trip is activated which lifts the pickup from the record and switches off the motor. It must be stressed that this is not a mechanical trip. It works by a 'shutter' below the lateral bearing influencing a photo-electric light transmission path. The action is thus wholly electronic and no stress is applied to the cartridge suspension. When the circuit is triggered a solenoid is energised which effectively flicks the arm lifting/lowering mechanism to the lift position while also killing the power to the motor.

The normal type of headshell is not used. Instead, the cartridge is first fitted and wired to a lightweight slide-in plastics holder. This method of cartridge fixing is a little more convenient than with the more conventional type of headshell. The holder with cartridge fitted is then pushed into the head end of the arm where automatic connection is made to the signal circuits. This is akin to the scheme used by Philips in the GA212 electronic deck.

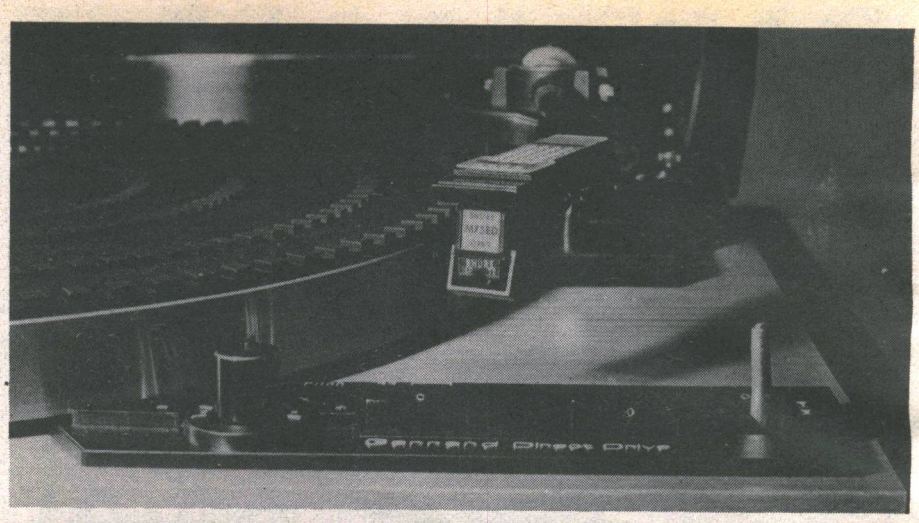
The signal circuits are terminated to left and right RCA 'phono' type sockets at the rear of the plinth, and terminated cables are supplied for connecting to the hi-fi amplifier or receiver.

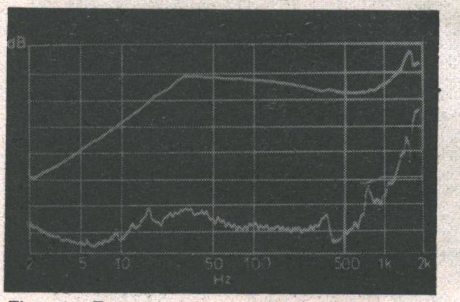
The deck is simple to assemble and connect up. It is well packed along with the transparent dust cover in a single box. The cover is equipped with a pair of friction-loaded hinges which plug into slots at the back of the plinth, and it is possible to adjust the friction so that the cover remains open at all but very low angles. The hinges of the test sample were rather creaky when operated, and by increasing the friction a fair amount of stress was applied to the back of the dust cover when lifted or lowered.

Under test

The deck was tested essentially with the fitted Shure M57ED/II cartridge, and the various test records used are mentioned in the captions. Frequency response and separation sweeps are given in Fig. 1 for the two channels at (a) and (b). It will be seen that the test record was constant amplitude at low frequencies and constant velocity at high frequencies. The cartridge exhibits the normal depression at upper middles and a little resonance just below 20kHz. The roll-off at the low-frequency end of the sweep, of course, results from the constant amplitude recording. The rate is 6dB/octave, and the consistency of this reveals without doubt that the low-frequency performance of the cartridge/arm combination is satisfactory. Separation is good, too, with respect to both channels, but one channel had better separation than the other.

These sweeps were taken at a tracking force of a mere 1·25g. This was, in fact, the optimum force as established by tracking tests using the Shure record and vari-





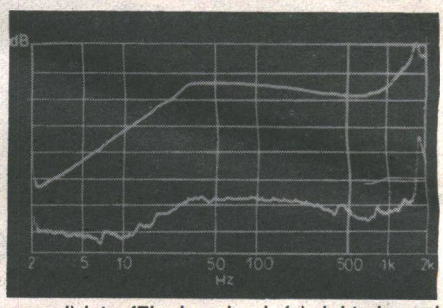
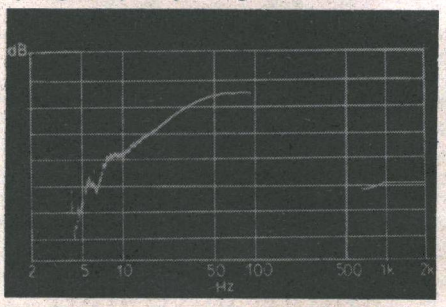


Fig. 1. Frequency response/separation of Shure M75ED/II cartridge fitted (constant amplitude low-frequency and constant velocity high-frequency using CBS STR-5002-C record) into 47k ohms load. (a) right channel and left-on-right. (b) left channel and right-on-left. Tracking force 1·5g. Scale Hz × 10 and 5dB/div.



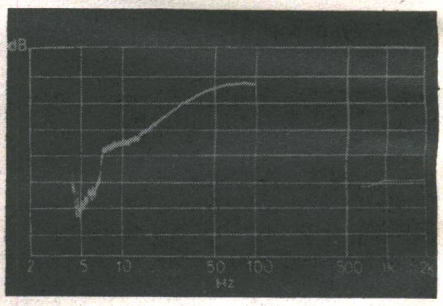
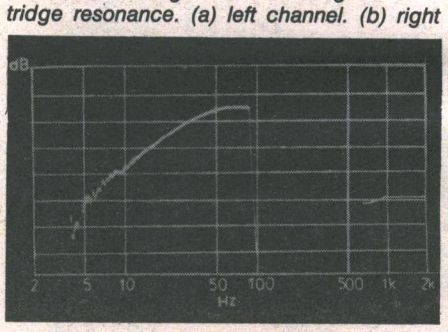


Fig. 2. Very low-frequency response of Shure M75ED/II cartridge fitted showing arm/cartridge resonance. (a) left channel. (b) right channel. Scale Hz ×1 and 5dB/div. Sweep 4Hz-100Hz. 1·5g tracking.



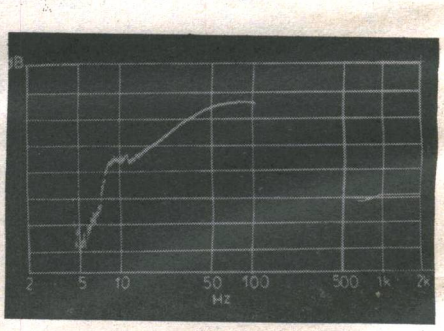


Fig. 3. Very low-frequency response of Shure V15/III cartridge showing arm cartridge resonance. (a) left channel. (b) right channel. Scale Hz ×1 and 5dB/div. Sweep 4Hz-100Hz. 1g tracking. Disc used for this and Fig. 2 Audio Technica XL-7001.

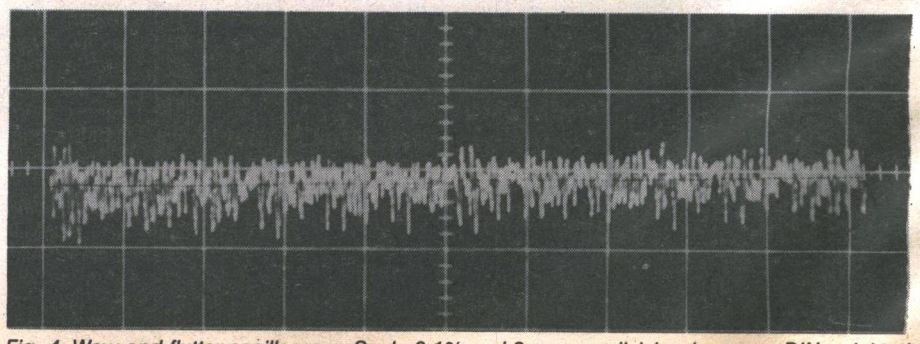


Fig. 4. Wow and flutter oscillogram. Scale 0·1% and 2sec. per division (average DIN weighted 0·06%). Audio Technical XL-7001 record.

ous other tone and music records. The oscillogram in Fig. 6 evaluates the tracking performance at high, medium and low frequencies (top to bottom) running at 1·25g. As will be seen from the caption, the peak modulation velocities of the test bands were quite high, so one can take the M75ED/II as a good tracker, which is fairly well known, anyway. In practical terms, this means that the cartridge in the Garrard arm will track the vast majority of heavily modulated and wide dynamic range music discs without undue distress.

Very low-frequency cartridge/arm compatibility was also evaluated and the sweeps over 4-100Hz in Fig. 2 for the two channels at (a) and (b) prove beyond dispute that the M75ED/II suits the arm very well. The resonances, falling between 5 and 10Hz, a little higher on the right than on the left channel, are well damped.

Similar measurements were made with the Shure V15/III mounted on the arm. These results are shown by the left and right channel sweeps at (a) and (b) in Fig. 3. This cartridge is better damped than the M75ED/II, and difficulty was experienced in exposing the resonances. One can be fairly safe in assuming, therefore, that the DD75 will suit the better class cartridges as well as the less exacting species lower down the price scale. Although it is easy to fix different cartridges to the plastics holder, trouble may be experienced in acquiring suitably-sized screws whose heads go into the cutouts on the holder and of the right length for the screw depth of the cartridge. The best plan would be to obtain one or two spare holders for accommodating any secondary cartridges that one may want to use. It then becomes an easy matter to change cartridges quickly.

All the other deck parameters were measured and the results are detailed in the accompanying table. Fig. 4 oscillogram shows the low wow and flutter yield over 20sec. (full sweep) on 0·1% div. vertical scaling. Motor run-up time in the 33⅓ rpm mode is evaluated by Fig. 7 oscillogram, which is scaled at 0·5sec./div. horizontally. The motor thus reaches its stabilised speed in less than one revolution. There is just the mere trace of speed overshoot at the point where the servo takes control.

The rumble was measured in accordance with various expressions and the results are given in the table. However, since there is talk of direct drive motors affecting the quality of the reproduction special attention was paid to this paramater and in analysing the results. The spectrogram in Fig. 5 shows each rumble component from zero to 100Hz (10Hz/div. horizontally) with reference to 10cm/sec. modulation level (this corresponds to 0dB at the top horizontal line of the graticule). The vast majority of the rumble components, therefore, are well below −55dB (vertical scale equals 10dB/div.). The highest amplitude ones occur round 10Hz, with a few minor peaks at 35Hz. General hum pick up can be seen at 50Hz at the middle of the display, but this is some 70dB down! The second harmonic of the hum at 100Hz (far right of the display) is about 75dB down. The analysing bandwidth was only 1Hz!

Sweeps were also made up to 1kHz and higher in an endeavour to detect spurious components which could possibly influence the reproduction, but there were none. With this particular motor, therefore, I feel pretty sure that the reproduction will remain pure and that improved results would *not* be obtained with a top-flight belt-driven deck.

This is not to state categorically, however, that certain direct drive motors of less exacting parameters could not flaw the reproduction, given 'golden ears'. In this case it could be possible for a belt-driven deck to audition more favourably. Much depends on the quality of the motor, its design exactitude and on whether one is comparing like with like had a very interesting discussion recently with S. K. Pramanik, mechanical and electronic engineer with B&O (of B&O stylus fame), about this very subject. It would appear from his researches that magnetostrictive effects *can* cause vertical vibration of the drive shaft when insufficient attention is given to the rotor design. With a mains driven motor the frequency would be 50Hz with multiple harmonics, while the frequency with a DC motor would depend on the commutating rate, but this is also generally close to the mains frequency and its harmonics.

Ordinary rumble measurements would fail to detect such shortcomings, so it seems that in future reviewers will have to run a spectral analysis of the rumble components (such as in Fig. 5) fully to evaluate the direct drive record playing deck. We shall in this lab be using this technique for all future reviews of such motors.

In summary, then, Garrard is back in the hi-fi turntable business with all banners flying! The DD75 is a very nice deck and one which I would not be ashamed of owning. I am looking forward to evaluating samples of the firm's different models of the series in due course, particularly the new zero tracking model (GT55P) with magnesium alloy arm.

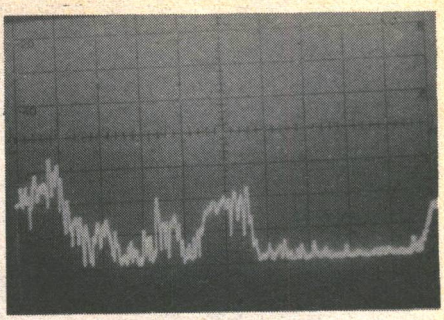


Fig. 5. Spectral analysis of rumble using Hewlett Packard 3580A spectrum analyser and HFS75 record. Sweep zero to 50Hz (ie, 5Hz/div. horizontally), analysing filter 1Hz and ref. 10cm/sec. recorded velocity (= 0dB).

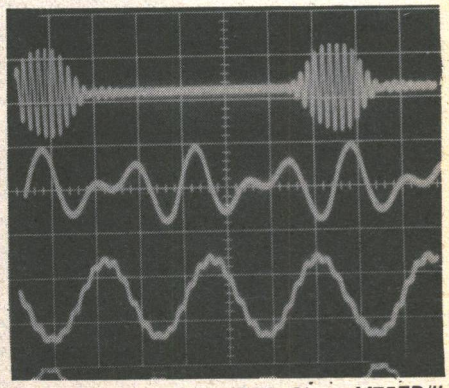


Fig. 6. Tracking ability of the Shure M75ED/II fitted at 1·25g tracking force. Top HF pulsed 10·8kHz at 30cm/sec. peak left channel. Middle MF 1kHz + 1·5kHz at 40cm/sec. peak lateral. Bottom LF 400Hz − 4kHz at 30cm/sec. peak lateral. Disc Shure TTR103.

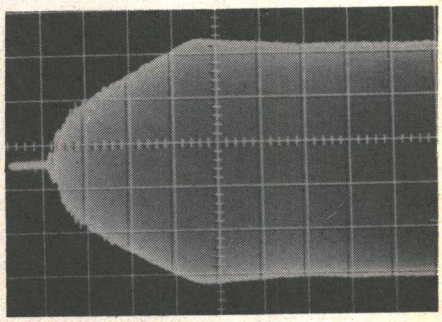


Fig. 7. Run-up time at 33 rpm. Time scale (horizontal) 0·5 sec./div.

GARRARD DD75 RECORD DECK

Parameter	Manufacturer's specifications	Test results
Turntable	307mm dia. diecast aluminium	Agreed
Motor	DC direct drive	Agreed
Speeds	33⅓ and 45 rpm	Agreed
Speed adjustment (pitch)	±3%	+5·22% −4%
Rumble	−50dB DIN-A; −70dB DIN-B	−48dB DIN-A; −68dB DIN-B; −43dB ref. 10cm/sec. via RIAA equalisation (no filtering)
Rumble spectral analysis	Not given	Fig. 5 spectrogram
Wow and flutter	0·06 peak (slow) DIN weighted	0·06% DIN weighted average. Also see Fig. 4
Minimum tracking force with suitable cartridge	0·75g	Agreed
Tracking ability with Shure M75ED/II as fitted	Not given	Assessed in Fig. 6 at 1·25g at LF, MF and HF
Arm/cartridge compatibility (LF resonance)	Not given	Fig. 2 for Shure M75ED/II as fitted and Fig. 3 for V15/III
Run-up time ref 33⅓ rpm	Not given	Assessed in Fig. 7 (1·75sec.)
Bearing break friction at stylus tip	Not given	<20mg vertical ≈20mg lateral
Bias force range	Not given	0 ≈700mg

Manufacturer: Garrard Engineering Limited, Newcastle Street, Swindon, Wiltshire, SN1 2LH.
Retail price *less VAT:* £123.50 *with* Shure M75ED/II cartridge

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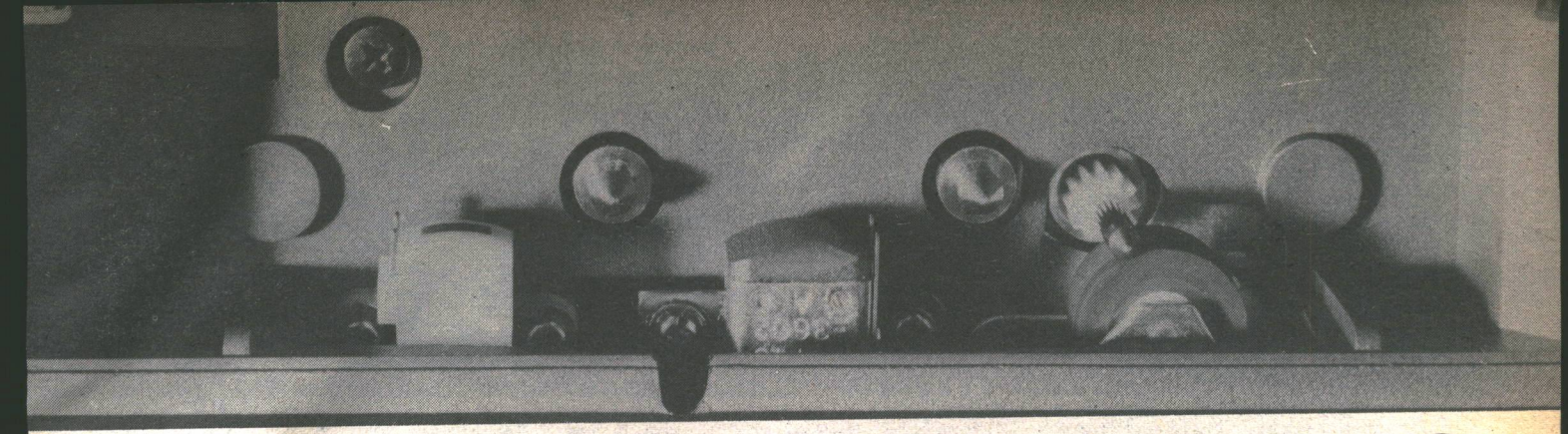
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Would you risk a C120?

By David Johnson

Prior to the advent of precision cassette recorders capable of hi-fi reproduction, the time taken to fast-rewind a cassette was thought to be an important selling point — the shorter the better in fact. But today's intelligent enthusiast is far more concerned to ensure that his precious tapes do not suffer damage from violent machinery and he will tolerate some extra winding time to guarantee this.

In achieving optimum tape usage there are many advantages in having 60 rather than 45 minutes per side to cover the classical repertoire, yet, like many music lovers interested in recording for pleasure, the author has been wary of C120's. Hi-fi deck manufacturer's instruction manuals often advise against them on mechanical grounds — but things are improving.

Mechanics

Recently, more attention has been given to the structural design of cassette bodies for use in consumer electronics. Control of friction by choice of better bearing and tape guidance materials has done much to reduce the need for extra internal pieceparts. But despite this, experience with 'Special Mechanics' indicates that however good the alternatives so far offered, there are still distinct advantages to be gained by using the patented BASF pivoted tusk method.

Fig. 1 shows the basic design. In addition to reducing the risk of tape sticking, it also minimises the chance of tangling during fast winding. Should the outermost portion of the tape go slack, the tusk is flung off its periphery and tends to take up the slackness, thus maintaining constant tension. As the tape becomes taut again, the tusk returns to provide a slight drag on the spool.

The success of the system depends greatly on reducing the drag effect of other bearing surfaces to a comparitively low level — particularly the thin plastic side cheeks which are interposed between the tape and the case — more on this subject later. In addition to tensioning by drag, an essential function of these flexible cheeks is to absorb the clearance between the spooled tape and the inside walls of the cassette body. The effect of dimensional tolerances in making the plastic mouldings is reduced and an even edge to the winding results.

To a first approximation the stresses applied to the tape at termination of fast-wind are proportional to the inertia of the system and the relative deceleration rates of the two spools. The larger the mass of the motor rotor, flywheel and pulley system, the greater the risk of excessive force being applied to the tape when the machine stops suddenly.

It follows that belt-drive decks which obtain low wow and flutter figures by having large flywheels need lower winding speeds or very special differential braking arrangements.

Table 1 is based on measurements made by Chris Morton of Upton Electronics*, Brixham; it shows the different fast-rewind speeds adopted by a selection of deck manufacturers. In a typical machine conservatively specifying 90 seconds for C60's, the tape velocity over the last few turns is more than 125cm/sec and the follower spool is rotating at over 1300rpm — startling figures considering that most decks are faster than this. Note that those companies who make both decks and cassettes appear to design for longer rewind times — a lesson here somewhere perhaps?

Machines with electronic, servo-operated sequencing and separate motors for capstan, fast forward and fast rewind, are capable of better control in starting and stopping. The Tandberg TCD 310 3-motor deck is a case in point and very fast times are achieved. By confining the flywheel mass to the capstan drive system, the inertia of the separate fast-wind motors can be kept to a minimum and synchronous braking applied.

As an example, the relative thickness and mechanical strengths of BASF C60, C90 and C120 cassette tapes are given in Table 2. The thinner base material used for C120's is more sensitive to control of tension at speed and more prone to stretching, crinkling and the sticking of adjacent layers on the spool. The curved tusks in Fig.1 assist in reducing thse effects.

Occasionally one finds that the first and last ten seconds of C120 cassettes are completely unusable owing to excessive drop out. Possible causes include mishandling in the factory and the effect of vapours from the cement used to attach the leader, but the author considers tape stretch due fast wind end-snatch to be the most likely one. The same effect is seen also in C90 sizes to a lesser but still unacceptable degree. Obviously some batches of tape are slightly more prone to drop-out than others.

One might hope that conditions when stopping dead at the end of the tape were generally less critical than intermediate halts because the stresses should be taken up by the thickened leader section. However, the length of leader seems to vary widely between the different brand names and also between samples from a single manufacturer.

The present situation is indicated by Table 3 which was compiled from actual measurements. To prevent tape snatch being applied to the coated section and relative slip between outer layers, the leader should at least be long enough to provide the entire distance from A to B on the sketch for Table 3. This means its minimum length must be 32cm and results suggest that a majority of manufacturers may not be achieving complete protection.

For some peculiar reason several makers have longer leaders at one end than the other — probably this is due to the design of their production machinery. Provided the shorter length is sufficient there is no problem here.

The maximum and minimum leader lengths measured among fifty BASF C90 LH Super samples were 40cm and 26cm respectively. Despite the large variation, their lengths are above average. In contrast, Sony and TDK samples showed less than 1cm variation from 29cm which appears to be the Japanese standard length.

Cassette manufacturers should look carefully at this problem and provide adequate leader length appropriate to tape thickness and strength. One can argue

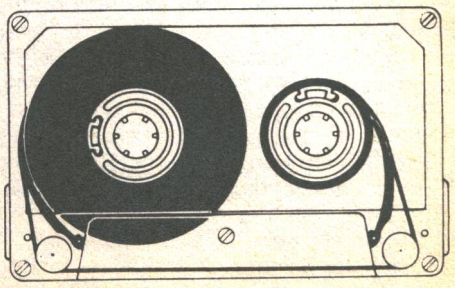
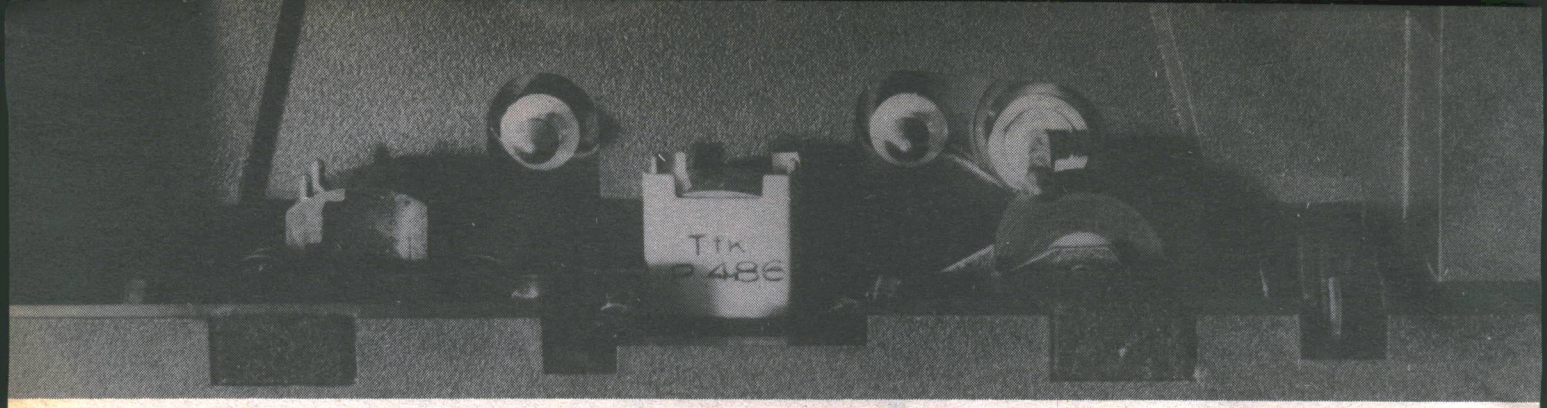


Fig. 1. A BASF 'SM' cassette



that it is the responsibility of deck makers to ensure that tapes are not damaged by machines. This may be fair comment but in this instance the obvious and cheapest remedy lies inside the cassette.

In the author's view all — but essentially C120 and C90 types would benefit by having at least 40cm; nearly double the present norm.

Angus McKenzie, in his excellent article in the May issue, has mentioned the problem of wow and flutter in BASF cassettes. It appears that at the time of conversion to Special Mechanics, they changed the number of spokes in the shallow indented side cheek pattern from 7 to 3, thus reducing the friction effect from that source. Is this sufficient?

Their present design appears to be based on a fixed rate spring action which may not adequately lessen cheek friction as the feed spool diameter becomes smaller. Perhaps this situation could be improved, either by reshaping to a single dish format, or by varying the depth and contour of the spokes?

Of special note is the fact that of all the many cassettes opened by the author, BASF are the only maker seen to run the tape inside the outermost fixed plastic pins in the tape path. In theory this should reduce tape friction, but it creates another potential hazard. Close inspection of a number of used BASF C90 and C120 cassettes invariably showed a build-up of magnetic powder on the pins in question.

A check on the geometry of the assembly indicates that build-up is more likely to occur when the spool is full and this is suggested as a second contributory cause of drop out from the first few turns of BASF cassettes. Their C120s are wound to a slightly larger final diameter than the C90s which must increase the effect. In contrast, no comparable deposits have been observed on the tusk tips.

To be fair to BASF it must be emphasised that they are good enough to be judged by the highest standards and the incidence of serious audible drop out is low. On this particular criterion, their ferric 'Super' cassettes are better than many other well-known products on the market.

Angus McKenzie also referred to the general problem of increasing back drag as the feed spool becomes emptied. This is due to the combined effects of its accelerating rotational speed and the greater area of tape contact on the outermost pin (BASF excepted).

In practice one finds a wide variety of materials, finishes and shaping among the side cheeks offered by different manufacturers. The latest Japanese types, eg, TDK-SA and Sony Fe-Cr use an impregnation in the plastic (graphite perhaps?) to further reduce friction, but they appear to prefer a slight dishing of the whole cheek in place of local indentations. Other manufacturers provide a plain flat cheek and hope for the best.

From the wow and flutter standpoint the best possible results can only be obtained by optimising the internal mechanics of the cassette separately for vertical and horizontal operation.

Whilst on the subject of desirable changes, regrettably it must be said that some cassette manufacturers are very slow in responding to complaints from dealers and the public; even when their products are demonstrably unsatisfactory. A well-known European multinational, until very recently, persisted in marketing a design in which the pulley bearing pin was anchored in one half of the body, but the mating half had a large clearance hole and provided no support for the free end of the pin. In time, the pin got bent — presumably due to fast-wind snatch — and eventually provided a rattling experience for the unwary user.

One major US company still offers a non-standard 'hard-to-open', 'flip-top' case containing a 'glued-together', 'see-through' cassette body with comparitively free-running spools and no calibration scale by the window.

It is well-known that slack pulley bearing and lack of sufficient tensioning friction can lead to greater risk of tape snagging. A transparent body at least allows easy observation of resultant tangles, but with glued bodies, unless you have very skilled fingers, a sharp razor blade and a confident psyche, you are advised to let things alone and curse from the outside looking in! If you do succeed in breaking and entering it is good practice to transfer the tape to a cassette body have screwed sides as, once snagging has occurred, the chances of a repeat performance are increased.

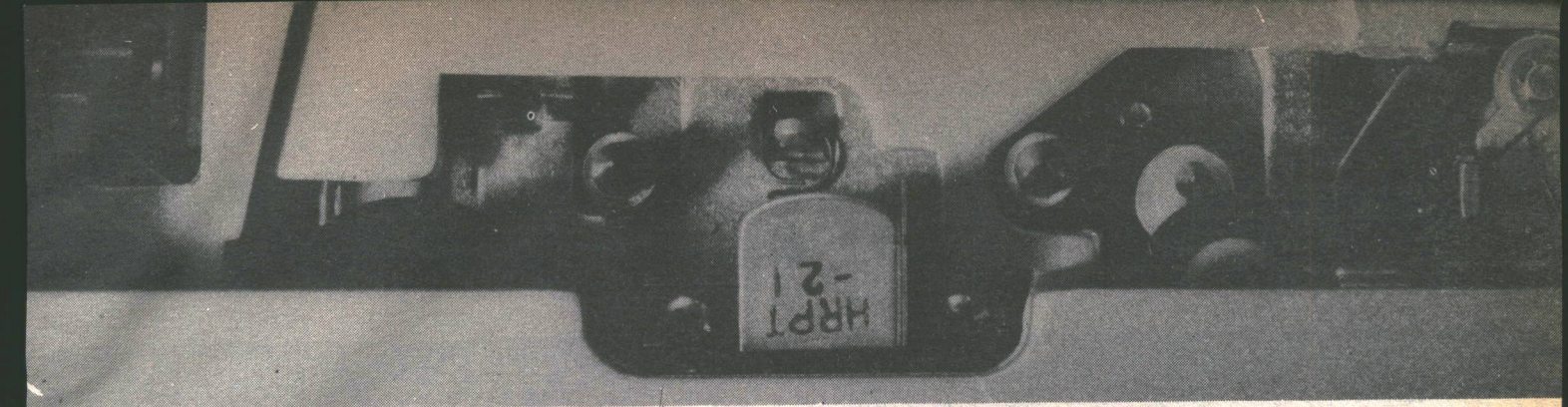
At the opposite extreme another American manufacturer offers really 'stiff' whisky! Excessive friction may damp out speed variation during fast winding, but pity the poor capstan with its wow and flutter problems during record/playback. A great shame to spoil excellent electrical performance with indifferent structural design.

From the purely mechanical standpoint one may give some general advice on use of C120 cassettes:

1. If your cassette deck instruction manual counsels against C120s it is desirable to contact the supplier's engineering department. Try to establish the *real* reason for the advice and whether the problem lies in record/playback or fast-wind mode. Some machines have no auto-shop in the event of tape tension extremes and could suffer mechanical damage if a jam occurred.
2. Check the actual fast rewind time of your machine; it may be significantly less than the specified maximum. You can use any size cassette and calculate it from the approximate time ratios: C60: C90: C120 ∨ 2: 3: 4.
3. Use of C120 cassettes having 'SM' can be regarded as safe in record/-playback modes on most machines, but wow and flutter specifications may not be met in all cases.
4. 'SM' types may also be considered safe in fast wind if the C60 rewind time exceeds 85 seconds (equivalent to 170 seconds for C120) and if the deck motors are not overloaded by the extra drag involved.
5. Where the requirement raised in (3) above is not met one can still use C120s provided all fast winding is done carefully with a hand winder, e.g. the one marketed by Bib. You can easily manage 90 seconds even allowing a slow down at the end.
6. Before committing a C120 cassette to hi-fi use, always run it through your machine once in each direction at fast speed. If there are noises suggesting abnormal friction or you hear the deck motor struggling, take no risks and return it for exchange without recording.
7. Begin and end your hi-fi couplings at least five seconds (or an equivalent counter reading) in from the start of the tape. Set the counter to zero in this condition so that if you have to fast rewind you can use the memory for auto-stop before the end of the tape is reached. These dodges will help protect your recordings from fast-wind snatch problems.
8. Whenever possible, store cassettes fresh from the record or playback modes rather than after fast winding. Due to the thin plastic used for C120 tapes they are more prone to 'print through' than C60s and C90s. This procedure will minimise the effect.

Electrical Considerations

Obviously one should not make the judgement on whether to use C120 cassettes on mechanical grounds alone. For technical reasons outside the scope of this article, their electrical performance is less likely to meet the same high specification as C60 and C90 sizes and, as already discussed, they are more likely to suffer degradation in use.



Nevertheless, critical subjective experiments with recent BASF LH Super SM and Agfa Superferrodynamic versions suggests that when handled with respect they are good enough for many purposes and capable of giving consistent results. Whilst noise and distortion levels are worse than C90 figures, few ears will detect the differences.

Table 4 gives a typical manufacturer's statement illustrating comparative performance of unused tapes. Although the C120 suffers slightly in the comparison, this is an area where we can expect some help in the future as control over uniformity of the size and electrical properties of magnetic particles improves.

Conclusions

In general the chances of buying mechanically perfect cassettes are at least as great as with discs. Perhaps the best advice one can give is — relax! Hope for better things in 1978, but for 1976 resolve to treat each purchase as if it were a bottle of wine. For a 'good year' read a 'reputable manufacturer' and remember that by paying more, all you are doing is improving the statistical likelihood of better electrical performance. Conversely, you may very occasionally strike lucky with a cheap product.

At the moment there is little correlation between price and mechanical quality. If you wish to try C120 cassettes, proceed with caution and stick to 'SM' types. At the moment this means that Agfa Super and BASF are the best buys, but watch out for short leaders.

*The author wishes to thank Upton Electronics for their assistance.

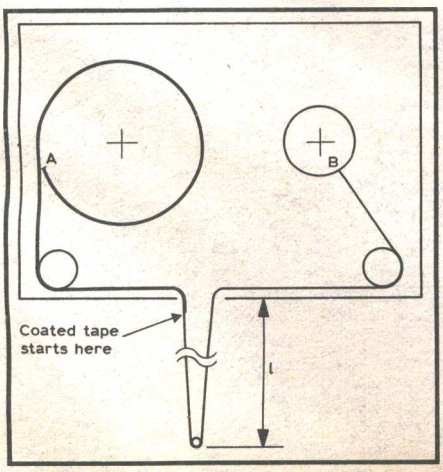


Fig. 2. The method of assessing leader lengths in Table 3.

TABLE 1

Fast Rewind Times in Seconds

MAKE & TYPE	C60 Spec	C60 Meas or Calc*	C90 Calc or (Spec)	C120 Meas or Calc*
Aiwa AD1300	120	115	163	234
AD1600	95	90	135	180
AD1800	95	90	135	180
AD6500	90	87	131	175
Akai CS34D		87	131	180
GXC38D	90		135	180*
GXC39D		56	84	115
GXC46D	65		98	130*
GXC75D	90		135	180*
GXC510D	60		90	120*
BASF 8200	190	85	128	170
Beltek M1150	80		120	160
Goodmans SCD100		95	143	190
Grundig CN30		83*	(125)	186*
Hitachi D2360	90	75	113	153*
D3500	90		135	180*
Harman Kardon		70*	(105)	140*
ITT Stereo 88	60		90	120*
JVC 1668U		80*	(120)	160*
Neal 102	67		100	134*
Philips 2N510	86		129	172*
Pye 9148	86		129	172*
Pioneer CTF 2121		82	123	165
CTF 5151		85	128	170
CTF 7171	83	73	110	148
Rotel RD20	95		143	190*
Sansui SC636	70		105	140*
Sony TC161SD		87*	(130)	174*
Tandberg TCD310	40	32	(55)	69
Teac A160	60		90	120*
A260	80		120	160*
A360	95	95	143	197
A400	100		150	200*
A450	95		143	190*
Technics RS271US		80*	(120)	160*
RS276	100		150	200*
RS676US	80		120	160*
Toshiba PT490		127*	(190)	254*
Trio KX710	82		123	164*
KX910	82		123	164*
Wharfedale XP		90	135	185
Yamaha TB700	100		(145)	200*

Notes: a) All measured results were made using BASF SM cassettes.
b) In no case did a measured rewind time exceed the specified maximum time.
c) Wherever possible, calculated times are based on measured results. Otherwise they are based on published data.

TABLE 2

Comparison of tape thickness and tensile strength

	C60	C90	C120	Unit
Uncoated tape thickness	12·0	7·5	6·0	Microns
Ultimate tensile strength	15·7	9·8	7·8	Newtons
Static tensile strength*	3·7	2·0	1·4	Newtons

*Nominal tensile strength for pre-stressed polyester tapes using DIN 45-522 for 0·3% elongation.
(Acknowledgements to BASF)

TABLE 3

Leader length in typical hi-fi cassettes

Manufacturer and type	Size	Approx leader length in cm Max	Min
Agfa Low Noise	C90	32	25
SFD	C60	32	26
SFD	C120	33	27
Chrom	C90	28	21
BASF LH Super	C90	40	26
LH Super	C120	38	33
EMI X1000	C90	35	30
Memorex MRx2	C90	35	35
Scotch Classic	C90	39	34
Sony FeCr	C60	29	29
Chrom	C90	29	29
TDK KR	C90	29	29
SA	C90	29	29
SD	C45	30	27
Deutche Gram*	—		—
32	*Pre-recorded		

*Pre-recorded cassette
Notes a) At termination of fast rewind, the free tape length from A to B includes one uncovered layer of the full spool and totals 32cm.
b) To compile this table leader length is taken as (2l+7·0) cm.

TABLE 4

Comparitive electrical performance
AGFA SFD — Manufacturer's specifications

	C60	C90	C120	Unit
3rd Harmonic distortion (250nWb/m)	0·9	1·6	3·5	%
Relative sensitivity (10kHz)	+1·5	+1·5	+1·0	dB
Signal/noise ratio (DIN,Max o/p level)	54	51	49·5	dB
Residual saturation flux	700	500	420	pWc
Max output (K3 = 3%)	+4	+1·5	−0·5	dB

Why should your ea



rs have all the fun?

Has it ever occurred to you that this magazine is devoted entirely to giving your ears a good time?

That your eyes might feel a little left out?

That the usual hi-fi expert's collection of odd boxes, knobs, wires and switches can hardly be described as a visual feast?

It occurred to us some while ago.

And as you can see, our new amplifier, tuner and cassette deck go a long way towards redressing the balance.

Hi-fi that entertains your eyes.

These new items don't just match electronically.

They actually look as if they're meant to go together.

All three boxes are the same size, with the same finish and matching controls. We've even made the cassette deck a front-loader, so it doesn't have to be kept apart from the others.

This is no haphazard collection of knobs, switches and dials.

Nothing is just for show.

The things that make them look good, aren't there just for show.

Consider the cassette deck.

Those elegant words, "Dolby System,"* mean you'll be listening to music, not hiss.

"Ferrite and Ferrite heads" means the heads last up to 200 times longer than ordinary ones.

One of those chunky switches is an equalisation control for all three kinds of tape. Another controls bias. Another cuts out distortion at unexpected peaks in recording level.

Broadcasting House, plonked in your sitting room.

One look at the long, elegant panel on the tuner will tell you it has four wavebands, not the usual two or three.

The two small dials tell you how strong your signal is, and let you tune very accurately.

The Hi-Blend button improves weak signals. The muting switch gets rid of interstation hissing.

While inside, lurk a seething mass of such electronic marvels as the FET front end, phase-locked-loop decoders and a uniphase filter.

This tuner practically lifts Broadcasting House into the sky and plonks it in your sitting room.

Do you love your neighbour?

If you love your neighbour, you'll both appreciate the "loudness" switch on the amplifier.

It means you can turn down the volume and still hear the extreme high and low notes.

Do you like the sound of other people's voices?

Then what you need is the "presence" switch. This boosts the middle frequencies to make speech stand out from background noise.

The amplifier also has click-stop bass and treble controls and facilities for two tape recorders.

Inside, a labyrinth of circuitry gives you 22 watts RMS per channel, elaborate protection circuits and direct coupled amplifier circuits.

Even your wallet will smile.

Two final points.

First, the names of our new pieces of equipment.

The amplifier is called Model TA 1630. The tuner is Model ST 2950F. The cassette deck is Model TC 186 SD. And they're just three of a new series of eight amplifiers, tuners and cassette decks.

Second, the price.

While this is anything but bargain-basement hi-fi, you'll find it costs quite a lot less than you'd expect.

We saw no reason to stop your wallet joining in the fun.

See the complete range of Sony Hi-Fi at your local Sony dealer or the Sony showroom, 134 Regent Street, London W1R 6DJ.

SONY.

*"Dolby" is a registered trade mark of Dolby Labs. Inc. All prices are recommended retail, and are correct at time of going to press.

LO-DOWN ON HI-FI

Part3 Frequency response

By John Peel

"Fine article, last month's piece," said the Editor, "but I think we can manage without all this pathetic joke-making at my expense."

"Sir, you speak and . . . "

"*You* speak far too much. This month you'll write about frequency response, two pages, all sensible informative stuff. And remember, we're holding your Quad valve amplifier as hostage until you've finished."

"Not my Quad valve amplifier — this is too much!"

"Get on with it . . . "

Right, no messing about this month.

Sound consists simply of very small variations in the air pressure around us. Everyone who suffered from physics at school will remember that the normal air pressure somewhere or other on Earth is about fifteen pounds per square inch.

The pressure variations that produce the sounds we hear are quite minute compared to this: the human ear is so sensitive we can *almost* hear the pressure change caused by just one molecule of air colliding with the ear drum. Gosh!

These variations can occur over a short period of time, in which case they're said to be high frequency sounds; relatively 'slow' vibrations being called low frequency sounds. The lower limit of human hearing is generally reckoned to be around twenty complete pressure variations each second and the upper, twenty thousand per second.

In the good old days this was very sensibly called twenty thousand cycles per second. But one of the benefits (?) of joining the EEC has been our adoption of the European unit. This is known as the Hertz (Hz), named after a rather brilliant man called Hertz. As you might guess, one Hertz equals one cycle per second.

(I've nothing against old Hertz, but I'd rather they'd honoured him with a statue or something useful like a library, instead of lumbering us with this term which, until

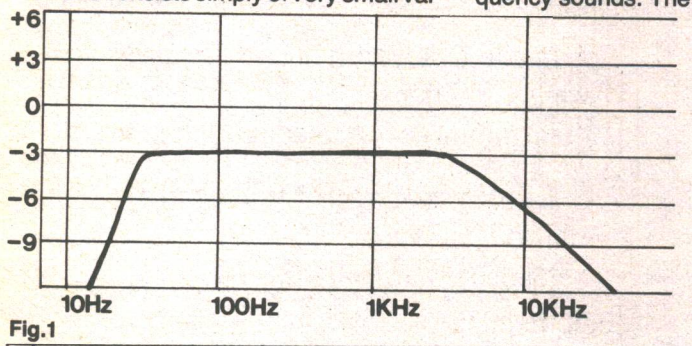


Fig.1

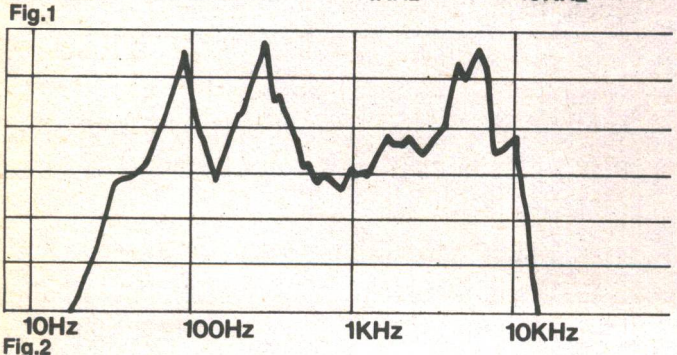


Fig.2

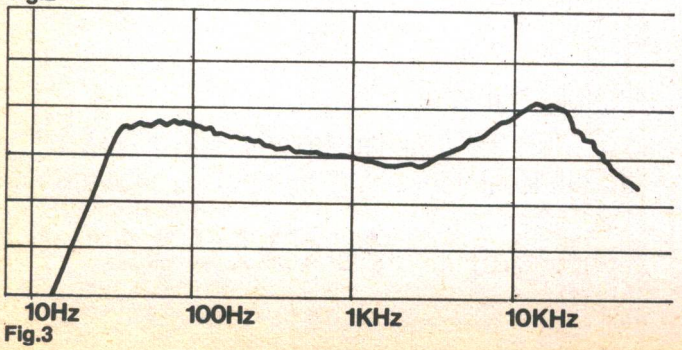


Fig.3

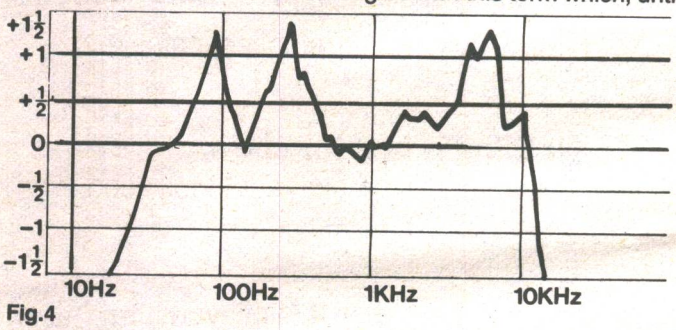


Fig.4

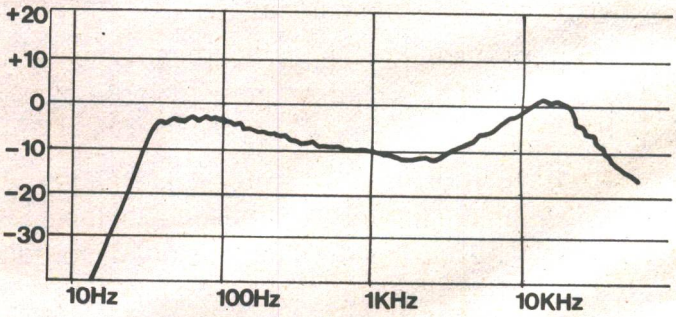


Fig.5

Fig. 1. -6dB points at 20Hz and 30kHz.
Fig. 2. The simple Simon Mk.1 speaker.
Fig. 3. The Wily Wonder Mk.1 Improved speaker.
Fig. 4. As Fig. 2, but with the all-important scale.
Fig. 5. The Wily Wonder Mk.1, also with its scale.

you've explained it, implies absolutely nothing to ordinary people.)

Anyway, the only musical instrument that reaches frequencies as low as 20 Hz is the organ, and only the largest organs at that. The grand piano's bottom note sets the air vibrating at just below 30 Hz, and the bass guitar's at just above 40 Hz. The vibrations produced by musical instruments can be as high as 20,000 Hz; for example the cymbal.

At this point we need to look a little deeper at what makes up a note from a musical instrument. Although we say, for convenience, that a note is at a certain frequency, it is in fact made up of many frequencies. These are higher in frequency than the basic or fundamental note, being known as overtones or harmonics. They partly account for the difference in sound between, say, a piano and a guitar playing the same basic note.

One of the requirements for high quality sound reproduction is that different frequencies are reproduced without being made louder or quieter than they should be. For some parts of the recording and replay chain the easiest way to do this is to make the equipment respond equally to all frequencies: for other parts we're better off using a 'distorted' response that will be corrected later in the chain.

If the response is not flat, taking the system as a whole, the tone of the musical instrument will be changed. The balance between the frequencies will be distorted, and some frequencies may not be reproduced at all.

What we obviously need is some way of measuring the frequency response, to know if it's flat when it should be distorted.

This is where the decibel enters the picture. Yes, you're right, as it happens, there was a chap called Bel, but the unit he cooked up wasn't as good as old Hertz's. Bel's Bel, a measure of *difference,* was rather unwieldy, a bit like measuring sound frequencies using cycles per week (1000 Hz = 604,800,000 cycles per week). The decibel (dB) is one tenth of a Bel, and at this point those already in the know about decibels will be expecting a long lecture on what they are and how they're worked out.

As it happens, no such lecture is about to be delivered. If you want to get deeply involved in hi-fi it *is* useful to know the mathematics involved, but what matters to most people is being able to use decibels to assess hi-fi equipment.

There are a few things though that *are* worth knowing. For example, if one sound has twice the power of another, the power difference is always 3dB. We can, in fact, hear very small distortions in frequency response, as little as ½dB in some circumstances. But, the human ear isn't a laboratory measuring instrument, and so we can't listen to two sounds and say, "That one is 3dB louder than the other".

How a piece of equipment performs is measured using a frequency response curve. Frequency is shown along the bottom, and the response at each frequency is measured by the height of the curve at that frequency. The left-hand scale indicates the deviation in dBs above or below the response at some chosen frequency, usually 1,000 Hz (abbreviated to 1 kHz).

These curves aren't based on power, however, they're a measure of difference in voltage. The important thing here is that whereas a 3dB difference in power represents a doubling, in voltage terms this doubling is expressed as a 6dB difference.

Fig. 1 illustrates this, at least provided the Art Department weren't round the pub again this lunchtime. In this particular case the output is 6dB less at 20Hz and 30kHz than at 1kHz, these being the half power points. We're assuming of course that the input has itself a flat frequency response.

I'd like to be able to make life easy and say that a variation of so-many dBs is acceptable and more than that isn't, but things don't work out that way in practice.

For a start, although the human ear can hear ½dB variations, we don't always notice them. For example, if you leave the tone controls on your amplifier in one position, but before you next listen someone moves the treble control an eighth of an inch to the left, you're unlikely to notice the difference in the sound when you next listen. But if you make this adjustment yourself and immediately listen critically, you probably will detect the change.

The conclusion is that, whilst frequency response deviations are undesirable, we can't say just how big a deviation is acceptable or unacceptable.

When it come to looking at specifications though, you'll find your biggest problem often isn't deciding how important a response deviation is, but finding out how big the deviation is in the first place.

Some manufacturers print irrelevant drivel like "Frequency Response 30-20,000 Hz" — not much use without a dB figure after it. On its own it's a bit like knowing that a car can travel a hundred miles, without having any idea how long it will take to get there!

As we'll see next month, you need to be *very* careful when looking into frequency response specifications, but for now I'll end by illustrating one way manufacturers can not so much "un-inform" as mis-inform.

Fig. 2 is the frequency response of the Simple Simon Mk 1 speaker, and it really doesn't look too hot does it? Certainly not a patch on the Wily Wonder Mk 1 IMPROVED, shown in Fig. 3.

Sad to say, Simple Simon didn't have the sense to put the dB scale on his curve, and Wily Wonder was much too clever to put it on his! When you put them into the picture you get Figs. 4 and 5. Now you can see that the Simple Simon's response is, in fact, much better than it's 'improved' competitor.

I should just add that there's an awful lot of Wily Wonders in the hi-fi world. The moral of this month's story is: If you're buying hi-fi watch out for Wily Wonders, and if you've got any spare money to invest, buy a controlling interest in Simple Simon and get him a good advertising agency!

It had to happen

Whenever we try to do something really splendid, something is bound to go wrong. And it did. During the production of part 2 in our massive loudspeaker test we were seriously pushed for time, resulting in a few silly mistakes slipping through into print. If these have confused you, check off the following list.

P.64, col.1, para 6, line 4: for 'fall' read 'fail'.

P.64, col.2, para 7, line 3: for 'extreme' read 'Bextrene'.

P.67, column 'JBL L36': Truth to life rating bar should be from 3·8 to 4·2. The relative loudness 'X' has slipped from position of 96dBA. Note also that the 100dbA vertical line has been omitted. Freq. balance refers to subjective impressions of frequency balance, and Sub colour refers to ratings for subjective colouration impressions.

P.69, col.1, para 3, line 3: 'very slightly *light* and. . .'

P.69, col.2, para 2, line 2: 'auditioned under *free* space. . .'

P.72, col.3, Section 'Summary', line 1: 'Bluntly this model did not do as badly as its design and. . .'

P.75, col.2, para 2, line 5: 'treble level is fractionally down *on the* bass and. . .'

P.75, col.2, para 5, line 5: for '8Hz' read '80Hz'.

P.80, col.2, last para, line 3: '. . .pany such a response were *not* made. . .'

P.81, col.3, 'Engineering Report' para 2, line 4: 'dome *stiffener* is cemented. . .'

P.101, col.3, last para, line 2: 'quality is *very fine and the unit can produce high levels* without distress or. . .

P.104, col.2, para 2, line 4: for 'life' read 'lift'.

The Rotel amplifier also suffered a trifle for on page 52, column 3, 200Hz should read 20Hz and 0·01% distortion should be 0·1%. The amplifier supplied was not, in fact to BEAB standard (note the cover plate reference on page 53), but all models sold will in future have no mains outlets. On page 54, column 3, 50Hz should read 50kHz.

Is it the Ferguson price or the Dolby system that makes it so popular?



This Ferguson Stereo Cassette Deck (model 3280) explodes the myth that high quality equipment must be expensive to be any good.

As soon as you plug it into your system you'll see what we mean. You'll be able to make recordings in stereo or mono and also play pre-recorded cassettes.

The famous Dolby* Noise Reduction System isn't the only feature that will help you. The two record level meters are illuminated so they're easy to keep an eye on and indicator lights show when the Dolby System, Chrome Tape, ALC, record and microphone are in use.

If you prefer to operate the record levels manually rather than leave it to be done automatically, you can use the professional type slider controls.

But the main controls are the piano key type.

These operate stop, rewind, fast forward, pause, play, eject and record. A push button resets the tape position indicator.

There's also a switch for chrome tape that alters bias and equalisation, and there is an Auto-Stop function.

As optional extras you can buy stereo headphones to monitor your recordings, and also an appropriate stereo microphone.

Of course not all Ferguson Stereo Cassette Decks include the Dolby System.

But like model 3279 shown below they do share one major feature.

Every one of them is excellent value for money.

Copyright of Dolby Laboratories Inc. DOLBY SYSTEM

Introduce your family to ours.



Seven headphones on test

By John Peel



The seven pairs of headphones reviewed here cover the most popular price range, from about £10 to £35 at 'typical selling prices'. Most of the 'phones in this review are discounted, often heavily, and the majority of buyers choose their dealers on the basis of price. Recommended retail price is therefore largely irrelevant, especially since some companies blatantly create inflated recommended prices, which all dealers buying in any quantity will be able to discount by 30% or more.

Prospective buyers will, hopefully, be more interested in subjective performances than technical measurements. Accordingly, these seven pairs of 'phones were assessed by listening to a variety of music, and no technical performance data is included.

All the 'phones were fed from the same system. Commercial records were used for the bulk of the tests, these being played on a Linn Sondek LP12, SME 3009 detachable, and an EMT XSD 15 cartridge.

The EMT is intended primarily for professional use and may be a stranger to many readers. As far as owning one is concerned, it's likely to remain a stranger too, since it costs nearly £180 and is not available through normal retail channels. It weighs a horrendous 21 gms, tracks its spherical stylus at 3 gms, and needs exceptionally careful setting up to realise its full potential.

With correct operating conditions it is one of the most neutral cartridges available, and is capable of extracting a tremendous amount of detail from record grooves. It's a moving coil type and although it has a much higher than average output, still needs a special 'head' amplifier before feeding into a normal RIAA magnetic input.

For these tests it was used in conjunction with two pre-amps: the Linn, designed for the Supex SD900 Super and made for them by Naim Audio, and two moving coil microphone inputs of a Sony MX650 mixer. The Linn gave cleaner treble reproduction, as was expected, but suffered from RF interference troubles. The Sony was rougher on treble, but surprisingly gave superior definition in the lower midrange and bass.

The output of each pre-amp was fed to a Quad 22/11 valve amplifier, the speaker outputs being connected to a Koss T/10A adaptor box.

This provides two sets of 'phones outputs with individual volume control from wirewound pots. In this function it works well, although the control knobs are a poor fit on their spindles and are better removed for positive volume control action.

It also provides an on-off switch for speakers, and I must caution readers against using this facility. The amplifier outputs are fed to the T/10A through thin ribbon cable, the speaker return signals being carried by additional cores of the same type. This ribbon cable is quite adequate for carrying signals *to* the adaptor, bearing in mind that 'phones' performance is not affected by the reduction in damping factor. Speakers are less tolerant, however, and the resistance of the cable from input to control box and back again totals nearly 1ohm, far too high and certain to result in softened bass with many speakers. This is a situation where you gain convenience but lose quality, a poor bargain for any hi-fi enthusiast.

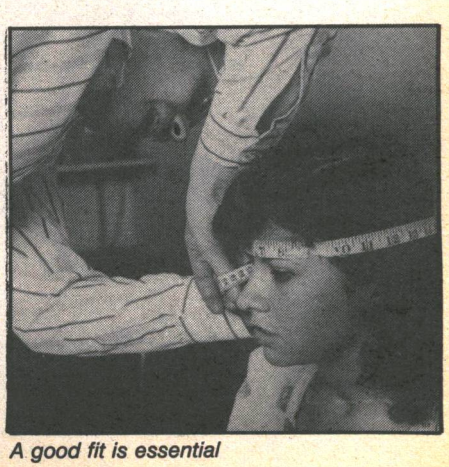
A pair of Spendor BC3s were available as a quality check, but were in no sense used as a reference for obvious reasons, speakers and 'phones being quite dissimilar in their presentation of spatial effects.

It's worth noting in passing that the BC3s are known for their low efficiency and for the difficulty nearly all transistor amplifiers have in driving the load they present. Valve amplifiers in general experience fewer problems with these speakers, and the Quad with its nominal 15 watts RMS per channel is able to produce peaks of 92dBA or so in a room of 1800 cu.ft.

Few 'phones in the price range covered by this review will be used with a system of this quality, and an attempt was made to assess performance under more 'typical' conditions.

To this end a good mid-price tuner (JVC JT-V31) was used to receive the Radio 3 broadcast of Holst's 'The Planets' Suite from this year's Henry Wood Promenade Concerts. A basic aerial was used and no attempt was made to 'tweak' the resulting signal. In order to allow comparisons at a later date, the tuner's output was fed to a dbx 124 noise reduction system, custom built frequency response equaliser and a Teac A7300-2T tape deck, using TDK Audua tape at 7½ ips, ½ track. The audible effects of background noise, 'spitching' and the like could then be easily assessed for each pair of 'phones.

Comfort plays an understandably large part in the choice of headphones, and several experienced listeners took part in a group session to assess comfort, as well as quality on gramophone records. Listeners at this session were Paul Hodges, Clive Waterman, Charlotte, and Chris Rogers, the well-known speaker designer and wit (!).



A good fit is essential

Sennheiser HD 400

Type	Magnetic
Lead length	10ft
Lead type	Straight
Phones weight	3oz
Phones + lead weight	4oz
Earpads removable	Yes
Efficiency	Average
Typical selling price	£10

These are a fairly recent introduction by Sennheiser, probably best known for their million-selling HD 414.

They are the lightest 'phones in this test, and were highly rated by all listeners for comfort. They fit *on* the ears, but unlike many such designs do not grip excessively. Adjustment is simple and positive, they stay where they're put, and the ear pieces tilt to allow for the 'angling' of the human ear.

Having praised their wearability, and bearing in mind their very moderate cost, one might expect the actual sound to be something of a disappointment. Not so! They give nothing away to their budget price and are eminently listenable.

Extreme bass was lacking, but this is a common complaint even in 'phones at three or four times their price. Extreme top was judged slightly down, which some listeners considered an advantage in producing a well-balanced sound.

Midband reproduction was generally clean, but with some muddiness in the upper bass region that can affect, for example, cellos and deep-voiced speakers. The effect is not gross, and simply leads to a loss of detail in the 100-300 Hz band.

The overall sound was 'relaxed', although lacking in spaciousness when compared with the best of the more expensive designs. Stereo image was quite reasonable, however, and ambience fared well despite some colouration from the upper bass lift.

At really high levels one could hear the 'phones 'working' to produce deep bass, but the effect must be considered marginal as soon as price enters the picture. Best results were obtained with the tone controls flat.

The HD 400s use a 'Y' type cable connection, the separate leads to each earpiece being rather short and thus tending to rub irritatingly on the listener's jaws as he turns or lowers his head. Users can solve this problem by cutting off the rubber sleeve at the junction of the 'Y' connection and separating a few more inches of cable.

In a price bracket distinguished, in my experience, by the mediocrity of most offerings, the Sennheiser HD 400s cannot be recommended too highly. Few purchasers will be disappointed.

Eagle H2008

Type	Magnetic
Lead length	3ft/12ft
Lead type	Coil
Phones + lead weight	12oz
Earpads removable	No
Efficiency	Very high
Typical selling price	£12.50-£14

The panel sessions produced a very low rating for these Eagle 'phones, both on comfort and quality. Like the Sennheisers, they sit *on* rather than *round* the ears, but exert rather more pressure. This can be reduced slightly by bending the headband, but even so they do tend to make their presence felt.

The coiled lead is, in my view, an unmitigated disaster. As soon as you try to extend it much beyond its coiled length of 3 ft, the strain of the lead on the left ear-piece tends to pull the 'phones off the listener's head. It must be cheaper to provide a 2 or 3 yard straight lead!

All this might be tolerable if the sounds produced were impressive. In fact, I suspect they are slightly better than quite a few 'phones at this price, but after the Sennheisers they were most disappointing.

Extreme bass emerges as a vague rumbling sound that intrudes on the rest of the music. String tone as reproduced from the Proms tape was murdered painfully, and all listeners felt the sound was far too aggressive. At low volumes the apparent detail this gave might be appreciated over short periods of time, but even moderate volumes for reasonable periods produced considerable fatigue.

Applause sounded more like a pan of frying chips, and treble was described as both 'glassy' and 'brittle'. Some treble cut and bass lift were necessary to produce an even remotely acceptable balance.

Heavy rock listeners might like the H2008s — they undoubtedly deliver a punchy sound with plenty of bite! But on acoustic instruments they sound almost like a 'Tomita'-type synthesiser imitation of the real thing.

To be fair to them they did achieve a superior stereo image to the Sennheisers, but most listeners are likely to agree that their disadvantages prevent full enjoyment of this positive aspect of their performance.

Howland West CIS 1100 — Waferlites

Type	Magnetic
Lead length	7ft
Lead type	Straight
Phones weight	4½oz
Phones + lead weight	7oz
Earpads removable	No
Efficiency	Average
Typical selling price	£18-£20



Unusual appearance immediately distinguishes the Waferlites — the slim design of the ear pieces is possible using a 'flat film' magnetic system.

Unlike the Sennheiser and Eagle models, they cannot be 'tilted' to fit the ear, but this didn't seem to post any comfort problems. On this score they were well rated, albeit slightly lower than the HD 400s (are we never going to hear the end of them?).

Reaction to the Waferlites depended very much on the balance of the programme material fed to them. On music with a warm or distant balance, they elicited detail and were enjoyable over long periods. At high volumes or on material with a more forward, brighter balance the midrange tended to become overbearing.

Extreme and upper bass needed some help from the tone controls, the deepest frequencies still being subdued but instruments in the upper bass region being reproduced with excellent attack. Treble cut could not tame the Waferlites' tendency to brightness without such an extreme amount of cut that instrument tone was destroyed.

Upper midband was marginally brittle and treble exhibited a small tendency toward 'tinniness'. They offer a generally dry sound which some will undoubtedly appreciate — indeed, I know several users of these 'phones who are well pleased by their performance for the price.

Nevertheless, I feel the response could do with a little taming in the 3-8 kHz region to produce a more generally balanced sound. Strangely perhaps in view of these comments, surface noise was not particularly emphasised.

Good but not exceptional value for money.

Yamaha HP1

Type	Magnetic
Lead length	10ft
Lead type	Straight
Phones weight	8oz
Phones + lead weight	9½oz
Earpads removable	No
Efficiency	Above average
Typical selling price	£29

The HP1s are Yamaha's top model and already enjoy a good reputation. The panel session produced varied comfort ratings, but I gather that most listeners do hold them in high regard on this score. Certainly, I found them very acceptable, even over long periods.

Deep bass did not fare too well, with 'grumpy' noises at high levels. Upper bass had a slightly coloured character, which, if the HP1s were speakers, would probably be described as 'cardboard'. This criticism is outweighed by the impressive definition achieved in this region, and bass performance overall was well liked.

Midrange balance was slightly on the warm side and described by one listener as 'fruity'. Top was very slightly down but essentially clean, and this is probably deliberate on Yamaha's part. I say this for two reasons: the market is known to like speakers and headphones with a warm balance, and those who prefer greater neutrality will find the HP1s respond well to treble lift from conventional tone controls (+½ on the Quad).

Given this small amount of top lift the overall balance was most acceptable. Stereo image and ambience were reasonable, but although the overall character of these 'phones can be described as 'relaxed' they lack the feeling of spaciousness achieved by the AKGs.

They are, however, neither tiring to wear nor to listen to, and as such are a well-balanced product with a sensible price-tag.

AKG K240

Type	Magnetic
Lead length	10ft
Lead	Straight
Phones weight	9 oz
Phone + lead weight	11oz
Earpads removable	Yes
Efficiency	Average
Typical selling price	£25

AKG have long experience in producing moving coil 'phones and in the days before hi-fi became a large consumer industry were one of the few specialists.

The K240s are one of their more recent introductions and unlike the four pairs already examined, use earcups that fit *found* the ears. The panel rated the AKGs low on comfort, although it's only fair to note that there was an element of dissent in the camp: yours truly. Perhaps I've got a funny head (you're never going to live that one down, John!) but I found them exceptionally comfortable, even over long periods.

The panel session was conducted with tone controls flat, and only one listener found much to commend in the sound. Treble was far too prominent, and for my own listening + 1 bass and − 2½ treble on the Quad produced the best balance. Given the rather excessive amount of treble cut they needed, the overall sound was generally impressive.

Deep bass was pleasant and moder-





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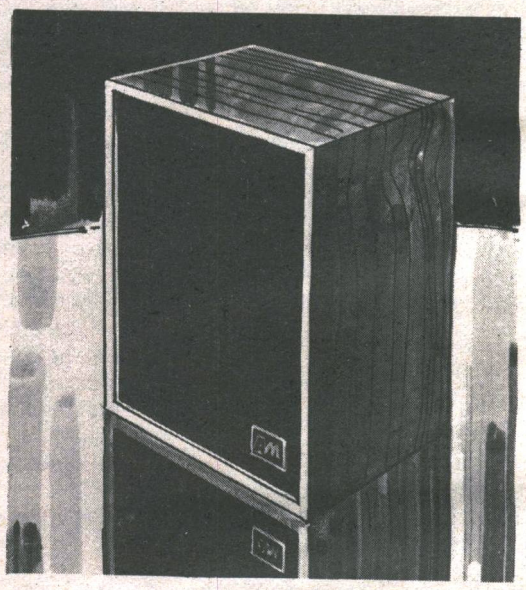
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ately detailed. In this region at least the K240s were superior to all the other 'phones in this test. Upper bass and lower midrange were slightly muddy, but acceptably so. Upper midband seemed OK — I can't say more than that because the K240s never drew attention to themselves in that part of the spectrum: surely a compliment!

Treble was, as noted, ludicrously exaggerated without some fairly extreme cut. Even then there was an edge on cymbals, and extreme top was considered marginally 'tinselly'. Despite this, surface noise was judged neutral.

These 'phones reveal tremendous detail in the signal, and offer a spacious stereo image that reproduces ambience well, if perhaps a little larger than life. They are not as 'relaxed' as either the Yamahas or the Sennheisers, and would undoubtedly show up deficiencies if used with a poor system. They will appeal most to those who like a 'positive' sound, and can be recommended as a fairly cheap pair of monitoring 'phones for recording work, given of course the necessary response tailoring.

Pioneer SE 700

Type	Piezo-electric
Lead length	10ft
Lead type	Straight
Phones weight	10½oz
Phone + lead weight	12oz
Earpads removable	See text
Efficiency	Very low
Typical selling price	£35

The SE 700s are supplied with a highly practical black plastic case, useful to keep them out of dust's way, and especially valuable protection for 'in the field' recordists. None of the other 'phones tested provided this accessory, but Eagle market a carrying case that should suit any of the 'phones, model number FF7 and price around £6.

The instructions indicate that the earpads, which rest *on* the ears, are removable for cleaning, but they appear to be glued to the cups themselves. Pioneer don't actually explain *how* to remove the pads, and short of tearing them asunder from the rest of the 'phones, the solution eludes me.

The panel rated the SE 700s low on comfort, and as supplied they grip the ears excessively. It is possible, however, to bend the headband to give a less tortuous fit. Even then, they tend to flatten the tops of the ears, and over long periods this, combined with a tendency to 'sweatiness', makes them rather oppressive.

Sad to say, these Pioneers did not fare at all well on sound quality. Bass is, quite simply, non-existent. What Pioneer have done with it, I can't imagine, but the effect is not dissimilar to a three-way speaker with the woofer turned off! Even full (+ 4) bass lift from the Quad produced no more than a pathetic muddy noise.

Midrange and top were both quite reasonably reproduced, although −1½ treble reduced a tendency to sibilant exaggeration. Some similarities in character to the Rotels were noted, though the Pioneers do not have their curious shyness in the lower treble region.

Obviously, neither I nor the panel were enthusiastic about these 'phones. As a pair of monitoring cans I shudder to think what balance the resulting tapes would have, especially since one simply *cannot* hear the bottom octaves.

Nevertheless, it could be that a dry, light 'clinical' sound is what some listeners yearn for, in which case the Pioneer SE 700s will have some appeal, especially if your head and ears prove compatible with the 'phones' fit.

Sorry, Shriro, but that's about as much sweetening as I can find to put on the pill!

Rotel RH 930

Type	Electret condenser
Lead length	4ft/13ft
Lead type	Coil
Phones weight	9oz
Phones + lead weight	12oz (14oz including transformer plug)
Earpads removable	Yes
Efficiency	Very low
Typical selling price	£25

These 'phones were included after I recently reviewed them for Hi-Fi Weekly. At that time, I had had only limited experience of the Yamahas and AKGs, and rated the RH 930s highly. The fact that the conclusions presented here are slightly less enthusiastic only goes to underline the dangers of reading too much into a review. No reviewer can audition *every* product of one type on the market before he comments on any, and there is always the danger that his overall rating will be changed after exposure to more of the competition.

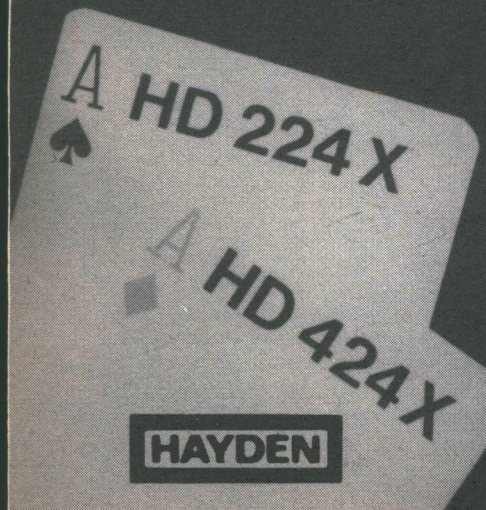
The panel's comfort rating varied considerably and my own experience places them in the average zone. Like the AKGs they use earcups, but these are slightly smaller and less deep. Thus, they tend to rub against the ears, and for some reason are marginally more 'sweaty' than the K240s.

Deep bass just doesn't make it at all, which is I suppose, at least better than a pile of distorted rubbish being reproduced. Upper bass and lower midrange are somewhat on the 'plummy' side, probably due to cavity resonance. The effect is not excessive, but it does blur detail in this region. Despite this, a little bass lift was considered necessary to help the overall balance, and —1 treble cut was also required. Midrange was



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HFP 11

acceptable in quality and dry in character. Lower treble was conspicuous by its absence, and this inhibited full appreciation of the cleanly reproduced extreme top.

Ambience was, for practical purposes, non-existent, and this must be considered quite an achievement (!?) when you consider the Royal Albert Hall's 'individualistic' acoustic. this ambience was well captured on the tape, but only the Pioneers succeeded in suppressing it as drastically as these Rotels.

Many listeners do seem to appreciate a dry sound, even when it is unnatural. They impart a 'dead, studio' atmosphere that I personally found rather soul-less and tended to emphasise 'ticks' in surface noise.

The jackplug, incidentally, includes matching transformers with a variable impedance switch. For these tests it was used in the L position, since M and H did not produce adequate volumes. Even on the L setting their efficiency is well below average like the Eagles, the coiled lead was not entirely satisfactory, although it was only at its full extension that it began to pull the 'phones from listeners' heads.

Reasonable value for money then, but with a fairly pronounced character of their own. A listening test is recommended

Off-beat?

Obviously, the Sennheiser HD 400s came out well in this test, but the individual headphone results do little to relate them to their more expensive competitors. Here the listening panel disagreed, with some members rating them the best of the 'phones examined, irrespective of price.

With such a small panel, however, the listeners may not have been 'typical', indeed probably weren't. I expect most enthusiasts would rate the Yamaha HP1s as superior overall, although the differences are surprisingly small in relation to price. What may not, however, be immediately apparent is that the Sennheiser HD 400s are far more then *just* a pair of headphones.



HD 400's – the other way round. See 'Off- beat'

Recording enthusiasts may have heard of 'dummy head' microphone techniques, featured more than once in previous issues of HFP. A 'true' dummy head mic will set you back around £100, the Sennheiser MKE 2002 being one of the few models available in the UK. The dummy head method uses two microphones placed in the ears of either a 'dummy' head, or preferably a real live human head. Such recordings are intended to be played back on 'phones only, and give poor results on speakers.

Conventional recordings played on 'phones generally locate sound sources *within* the listener's head, an unnatural experience to say the least. A properly made dummy head recording, in contrast, locates the sources anywhere but inside the head. They are placed in an entirely believable acoustic, and in addition to 'side to side' locations, one can tell whether the sound source is in front of or behind the listener as well as being able to tell how far away the source is.

What's all this got to do with the HD 400? Apart from the fact that they are well suited to replaying such recordings, they can be easily converted, at a cost of less than £1, into a pair of quite acceptable dummy head microphones.

Simply replace the stereo jack-plug with two mono plugs, slide the earcups off the headband and replace them with the pads facing *outward*. You wear the resulting contraption exactly as if it were a pair of headphones, the magnet assemblies being small enough to fit into the ears without discomfort. Any normal low or medium impedance, unbalanced microphone inputs can be used, ideally those designed for 600 ohm mics. Most cassette and open-reel decks have suitable inputs.

All in all

Getting back to more normal activities, such as using headphones as headphones (how boring!), the Yamaha HP1s are a safe recommendation in the more expensive price bracket. They are well made, comfortable and have few sonic vices. Ideally, though, you should make some comparisons before buying. I suspect those who like a bright, punchy sound will find the Howland Wests attractive, and they are noticeably less expensive.

Comparisons between the AKG K240s and the HP1s are difficult. Some, it would seem, find the AKGs uncomfortable, and they undoubtedly sound terrible if some fairly severe top cut is not used. Their main advantage over the HP1s is a more open stereo image and superior presentation of deep bass. Against this, though, the treble does have an artificial sting, even with treble cut, and the Yamahas definitely score here.

Unlike the AKGs, the Rotel RH930s do not seem to have any particularly strong points, and an 'average' buyer would probably find the Yamaha HP1s preferable. Not all buyers are 'average' though, sufficient reason to give them a listen before making your choice.

If from the comments on each pair of 'phones you feel that one of the models not especially recommended would produce the kind of sound *you* would like, then don't let these conclusions deter you. Whatever the 'ears' in this test have concluded, it's what your ears like that matters when it's your money you're spending.



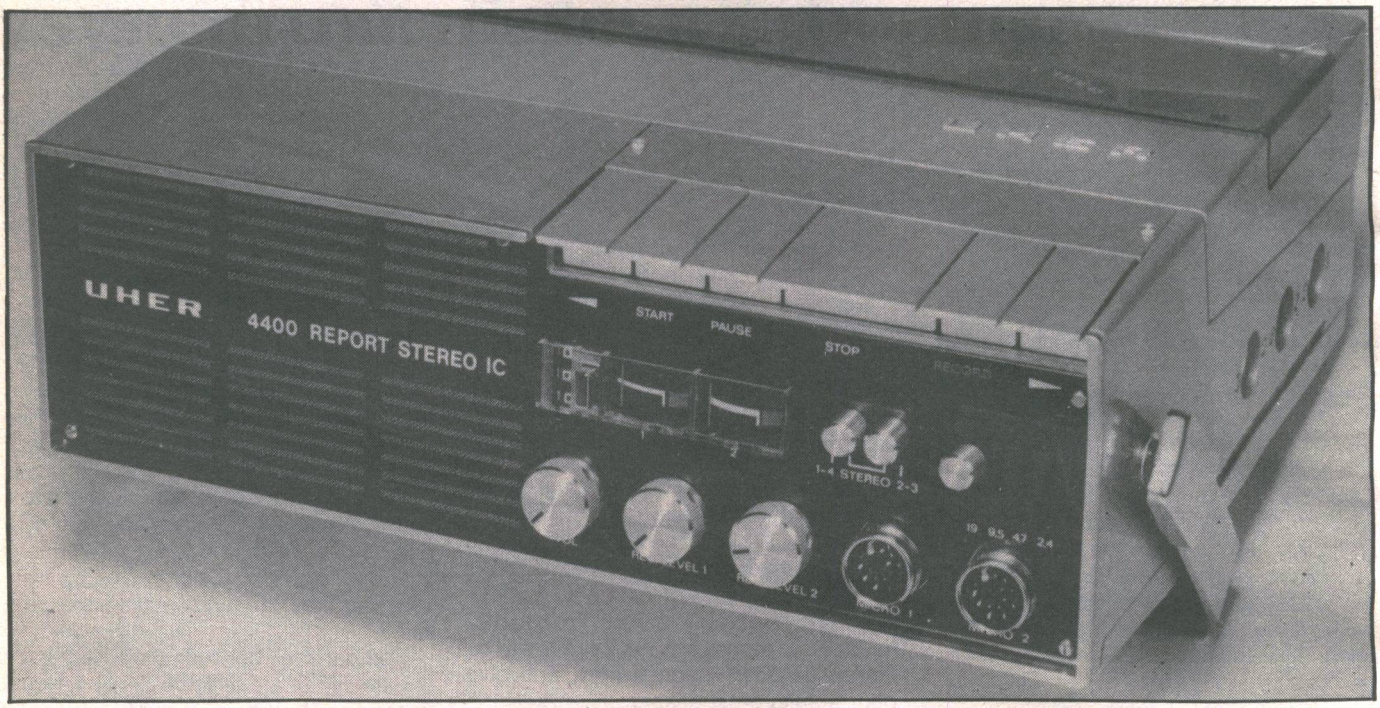
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Acoustic Research International for the loan of the Teac A7300-2T and dbx 124.
F.W.O. Bauch Ltd. for the loan of the EMT XSD 15 cartridge
JVC for the loan of the JT-V31 stereo tuner
TDK for their Audua tape (incidentally, by the time this review is published it will be available in a matt-backed format)
Unilet Products Ltd., New Malden, for the loan of several of the 'phones tested
Derek Scotland of Audio Laboratories for design and prototype work on the tape system equaliser and for the loan of his BC3s
All those who took part in the listening sessions and helped in other ways.

Portable Recorders

Can quality and portability go hand in hand?

By M.G. SKEET



This report looks at four stereo battery portable tape recorders. Three are cassette and for the sake of interest one is reel-to-reel.

Predictably there isn't one with all plus points. So in the final analysis it could be a particular feature that sways you in favour of one machine opposed to another. That is, of course, distinct from price considerations or brand loyalty.

Within the comparitively narrow scope of the report, in terms of numbers of machines, we can readily make comparisons. This we will do in table form, grouping related aspects. Summaries under these groupings will discuss the pros and cons further.

Handling — Table 1

The smallest and lightest machine is the one with the ability to take the largest reels of tape— the Uher reel to reel (125mm or 5in diameter spools)! It is certainly amusing that, with the cassette itself being so finitely small, two of the cassette portables are large and the Nakamichi huge! We have heard the Sony described as built like a Lancaster Bomber by a newcomer to stereo battery portables. By this token the Nakamichi *could be an aircraft carrier.*

Obviously size is related to weight and the Uher reel-to-reel is the lightest. In use thus 10 per cent to 25 per cent less weight than the others is appreciated. Around the neck the Nakamichi is certainly the most fatiguing.

TABLE 1

Feature	Sony TC153SD	JVC CD1635 B	Nakamichi 550	Uher 4400 IC
Size W × D × H (mm)	350 × 230 × 100	355 × 250 × 100	315 × 355 × 100	285 × 235 × 105
Weight (lb)	2nd Lightest 11lb	Near to Sony 11·5lb	Heaviest 12lb	Lightest 10lb
Deck Control Positions	Along front edge at left	Along front edge at right	Recessed in top at left	Along front edge at right
Record Level Controls	Separate for left and right channels 30mm traverse slider controls. Scaling 0-10	Large ganged rotary master with click stops. Separate small rotary presets. 'Dot' scaling	Friction ganged rotary for L and R. Separate rotary for centre mic input. Scaling 0-10.	Separate small L and R rotary beside similar mono vol. control. No scaling
Recorder on neck strap. Ease of record level control and meter viewing.	Level controls at extreme right. Fingers of right hand can be used (around neck strap). Meters are not obscured. Mic inputs on left.	The large ganged rotary control is centrally placed. Right hand must be used or else meters would be obscure. Mic inputs on right.	Stereo and sep. centre mic. controls on left. Large meters centrally placed. Control by left hand reaching around strap. Mic. inputs on R.	Level controls just right of centre below level meters. Difficult not to obscure meters. Mic inputs beside knobs.
Carrying case necessary	Leather eveready carrying case with cut aways for controls etc.	Close fitting ever-ready case with cut aways. Clip on rain fly sheet.	Case of machine padded. Simple plastics bag supplied for rain protection.	Substantial box type case. Lid clips away to expose controls.
Can it be placed on muddy ground?	Yes in the sense that there are no sockets along the back edge. Fair stability	Yes for similar reasons as the Sony. Stability very similar also.	Many sockets and adjustment points along front edge. Very poor stability:	There is very good protection and stability presents no problems.

All neck straps fit to the machines and not to the carrying cases. Adjustment is provided, with the Nakamichi and Uher having the greatest range.

In many products there is often apparent evidence of stylists having a go after the design engineer has done his bit. The Nakamichi neck strap fixings must be a case in point. Luckily without further consequence, the Nakamichi fixing came apart due to a screw of insufficient thread length in the fancy fixing knob. It wasn't in use around the neck at the time, but if it had been perhaps we would be able to comment on an unscheduled impact test! Also it is not impossible that the metal adjusting buckle could be dropped to break the glass of a level meter.

On the question of record level control and meter viewing when in use around the neck it can be seen straight away that all virtues do not rest in one machine. The Uher takes the back seat, for fades of stereo signals, without image position shift are very difficult to achieve. Special praise is needed for the JVC arrangement. All these machines are hopefully going to be used, in the main, with microphone signal inputs and in such live recording anything that makes the job of level control more successful is worthwhile. The small 'presets' are connected in the circuitry before the ganged record master. These pre-sets are set so that the master control can confidently be used over the majority of its travel and not just over a small distance barely off the stop. This is a desirable feature and could find a place on recorders other than battery portables.

We were previously not aware that the Nakamichi had a centre 'blend' microphone input. Advertisements recently seen had not drawn attention to this feature. The provision is a plus point — more discussion on this later.

The deck top lever switches on the Sony project further than those on the JVC. They can be accidently moved especially if the carrying case is not fitted.

The Uher carrying case undoubtedly gives the best mechanical protection and the lid fully covers the control front panel when closed. The Sony and JVC cases are similar in having cut-aways for the various controls and cassette compartment flaps. The JVC case has a detachable rain fly sheet which press studs to the carrying case.

To stand the Nakamichi on muddy ground is asking for trouble and yet isn't this the natural thing to have to do when out and about? No we are not asking for amphibious recorders, but to have sockets and adjustment points along the back edge of a portable detracts from its primary use. Also the machine is the least stable of the four when stood on its back edge.

Metering — Table 2

It can be useful to know what meter reading is obtained on playing back a reference level tape. The excellent Metrosound Dolby level reference (200nWb/m) cassette gives the playback readings indicated. Also it is useful to use such level reference tapes when copying tapes. This way the copies can be more related, in level versus noise and distortion, to the original.

The odd few dB discrepancies in the various machines' meters indication of playback Dolby level is interesting. The Nakamichi −1dB is consistent with it being set with a Japanese Dolby level tape which are reckoned to be a dB up on the proper standard (which the Metrosound conforms to).

The Nakamichi has facilities for setting encoder Dolby level on record to allow for different tape sensitivities — more later in the section on performance aspects.

There is something to be said for having the record meters connected after the record HF boost. Only the Uher has meters so connected.

The Nakamichi has some unique wide range meter scaling (-40dB to 5dB). In practice the range is wider. In use it is really advantageous (if needing some getting used to) to 'see' more of what one is recording.

Meter performance—Table 3

It was instructive to compare all the recorder's meters performance to an Ernest Turner PPM with Surrey Electronics drive circuitry. This equipment has special ballistic meters to BBC ED 1498/9 and drive circuitry to B54297. Overshooting is no real problem as is response to long duration pulses of 300ms. The 4ms pulses barely show on the Sony or JVC. On Nakamichi — 14dB is a healthy reading owing to the expanded scaling. The Uher's little meters were able to show these pulses quite well.

The speech signals showed the Nakamichi and Uher to compare best with the PPM. Both quite well in fact.

Meters having long release times provide the advantage that the pointer remains where it has been long enough to be read. In comparison with the PPM the Nakamichi is sensibly better than the others. The Uher's meters, though small and stark are not poor. The Sony and JVC meters are typical of most recorder meters in having no release delay.

In practice it is possible to allow healthy readings on the Nakamichi and Uher meters, but with the Sony and JVC it is best apparently to peak around —6 or tape overload may occur.

Facilities — Table 4

The purpose of Auto Switch off is to avoid the chance of damage to the capstan or other mechanical problems or battery drain when a cassette reaches the end or jams. (Incidentally we haven't been troubled by cassettes jamming). With the Uher the tape of course comes off the feed spool and the capstan continues untroubled.

The three cassette recorders have their resettable tape counters on the deck 'top' and are not visible, therefore, when carried on the neck strap. The Nakamichi has adjustable tape alarm. The LED indicator for this is on the front panel.

Also as mentioned earlier tape footage is indicated when the battery check button

TABLE 2

Feature	Sony	JVC	Nakamichi	Uher
Meter lighting	Non-locking push button	Locking toggle switch	Locking push button	LH record knob pulled out.
Battery state indication on record meters	Non-locking push button when machine is running	Non-locking toggle switch when machine running	Non-locking push button. Also shows tape footage	RH record level knob pulled out when machine running
Meters function on playback	Yes. 0dB with Dolby level tape	Yes +2dB with Dolby level tape	Yes −1dB with Dolby level tape	No indication on playback
Meter circuit Connection point before/after				
(1) Record Equalisation	Before	Before	Before	After
(2) Noise reduction encoder.	Before	After	Before	Not applicable
Meter dB Scale accuracy	Very good on both meters	LH channel worst −10dB on scale is −7dB	good to −20dB −30dB on scale is −35dB	no scaling provided
Meter frequency accuracy, ref. 1kHz	Good	Good	Very good	HF record boost shown



JVC CD1635B

is pressed. It is done on the LH meter. The cassette take up hub is subjected to different speeds of rotation throughout the running of a cassette and this is sensed and displayed on the meter.

Internal loudspeakers are strictly 'hear if its there' monitoring and are adequate for this task.

There are a couple of headphone usage aspects related to Table 4. In the JVC the headphone feed is connected rather ridiculously after the encode boosting of HF by the ANRS circuitry. Quality aspects of monitoring on record are thus disturbed. The Uher's two DIN loudspeaker sockets have to be used for headphone connections and one is fitted at each side of the machine! A split lead is thus required. If some attenuation is arranged (150 ohms approx in series) 8 ohm phones could be used.

On the Sony the DIN input/output socket can be used for microphone inputs (pins 1 and 4 for L and R signal, pin 2 earth). The Uher's 7-pin sockets can have microphones on 5-pin plugs (each using pin 3 for signal and pin 2 for earth).

It is handy with the JVC and Sony recorders to be able to plug in directly to the mains with the leads supplied. With all the machines, plugging in an external power source (mains direct or from external power units) any internal batteries are disconnected.

Mic inputs — Table 5

One ceases to be able to maintain sensible control over input levels with a record level control at anything below 20 per cent of its travel. By this we mean having sufficient distance to travel to fade in and out. Using the recorders in this manner some figures emerge for maximum input levels that can be controlled.

The Sony and the JVC have switchable attenuators in front of the mic pre-amps and they are most useful in high sound level situations.

The JVC neatly side steps the 20 per cent rotation theory due to the record pre-sets mentioned earlier.

For comparison with the figures in the table many microphones produce 1mV on 'projected' voice at one metre.

Mic. pre-amp overload figures are also given in the table. It is emerging that 40mV and above are good figures. Of course a user will know that trouble is near — the record level control was barely off the stop in all the above cases.

At the other extreme, mic pre-amps can contribute noise if the record level control has to be used too far up. The mic inputs were loaded with 200 ohms and recordings made (with noise reduction in the cassette recorder cases) and the point of rotation of the record level control where the pre-amp noise could be heard, above playback tape hiss, was noted. These are pretty usual figures and bear in mind that the same positions apply on DIN socket inputs. On phono inputs both the Sony and the JVC bypass their mic pre-amps.

In practice with a microphone there is usually sufficient ambient noise pickup by the microphone for another 10 per cent to be added to the rotation before noise is noticed. Also in my experience at mic levels encountered it usually means that one doesn't often have to advance the controls into the noise impairment region. We did a quick check with a 'professional' low noise pre-amp (Surrey Electronics) and noticeably quieter results can be produced with all machines, than when their own mic pre-amps are used at maximum sensitivity .

Consumption — Table 6

The Sony and the Uher both, by the figures and in our experience of them, make much bigger demands on the power supplies. Both are clear candidates for the use of rechargeable battery packs that are recharged automatically when mains is connected. In the case of the Sony this is when the mains is directly connected. The Uher battery is recharged with an external charger. The latter can also be installed inside the machine.

Bear in mind that intermittent use, when flashlight type batteries are used, extends their effective life.

The JVC and Nakamichi designs are very much more economical and in excess of 10 hours continuous recording use can be expected on high performance cells. The Sony and Uher can achieve something like 1½ hours in similar circumstances.

The Nakamichi can catch you out as 85 mA is drawn when the power on button is pressed, but the deck is not in record or playback etc. On the other machines the deck must 'run' before current is consumed.

Electrical performance — Table 7

The figures in Table 7 could generate a thousand times as many words! We will try to keep the comments as near to the point as possible.

Nakamichi lead on the recommended tape question. A label on the packing box details the particular tapes that the enclosed machine is set up for. The success of the setting up was borne out in all aspects of the Nakamichi's usage and testing. The overall performance of a cassette machine is particularly dependant on its setting up to a particular tape. The Nakamichi was supplied with a Nakamichi

TABLE 3

Test	PPM	Sony	JVC	Nakamichi	Uher
Observable overshoot when 0dB 1kHz tone connnected	width of pointer	Nil	+1dB	+1dB	+1dB estimated
Response to 300ms pulse of 0dB level	0dB	0dB	+1dB	+1dB	+1dB estimated
Response to 4ms pulse of 0dB level	−5dB	−20dB	−15dB	−14dB	−10dB estimated
Response to speech peaked to 0dB on the PPM	0dB	−7	−6	−2	Healthy reading
Release time to −30dB or pointer at standstill from 0dB reading.	3sec (−30dB)	too fast to measure	too fast to measure	1·2 sec (−30dB)	0·8 sec



Sony TC 153SD

C60 EX cassette which is apparently Maxwell UD.

The Uher service sheet supplied recommends BASF DP26 and a reel is supplied. The Sony was supplied with a C60 Sony FeCr.

The wow and flutter figures are all good. Obviously the reel-to-reel is better than the others, closely followed by the Nakamichi. The cassette recorders are very much more affected by the cassette used than the reel-to-reel is by its software. The figures for the cassette recorders are the average of several known 'good mechanics' cassettes. It was pleasing that there was little perceptible change when the machines were used around the neck, the Sony seemingly more regularly producing a different figure when used vertically. We do not imagine users trying to record a piano by running after one being carried on the back of a lorry!

The last test in the table is always of interest to the writer, as is the playback meter reading from a Dolby level test tape detailed in an earlier table. Knowing where one stands in tape copying is the concern.

The other seven comparison points are not entirely unconnected or unrelated to each other. To try and pick a comprehensible path through the figures we will start with compliance to standard frequency response test tapes.

The Uher is engineered to conform to the IEC 70μS standard and if its tapes are played back on a machine to the NAB 50+ 3180μS standard then the top and bottom will be some 2 — 3dB down.

The three cassette recorders show discrepancies which in some way point to disagreement over frequency standards (or on the methods of measurements). Do not read too much into specific figures, but the overall comparison can be made which explains a listening test anomaly noted in the interchange of cassettes between machines. The JVC plays the other machines' recordings with a noticeable reduction in top. Also its signal-to-noise ratio figures are better owing to this HF difference. On its own recordings, as wide or even wider results were attained. The use of more record HF boost is indicated and the lower frequency of the 3dB HF compression seems to confirm this.

The overall distortion figures are generally as expected. It is usually true that CrO2 tape produces the worse figures.

The interrelation of the various test figures is never more true than with the effect that record bias levels has on HF response and distortion. Readers are recommended to note the following generalisation — under-bias produces more distortion, more dropout and increased HF sensitivity whereas over-bias optimises distortion and dropout, but reduces HF response.

The Sony and JVC test results bear out these points. Regarding bias levels the Nakamichi alone has the proper proven difference applicable to Ferric and CrO2 tapes. The JVC in common with many cassette recorders had a smaller range. Curiously the Sony exhibits no change in record bias levels! Obviously the end results can be achieved by equalisation changes, however, at less than optimum in some parameters. The fixed bias level is around midway between Ferric and CrO2 requirements. The distortion figures on the latter tape seem to confirm this, being up on average. The 3dB HF compression point for Ferric and FeCr is at a lower frequency as a result although the Fe Cr figure is down even more than

TABLE 4

Feature	Sony	JVC	Nakamichi	Uher
Auto switch off	Rec and PB only	all modes	all modes	none provided
3-digit resetable Tape counter	not visible when when carried	not visible when carried	not visible when carried	on front panel visible carried
Internal loudspeaker and controls	Yes, rotary level and tone controls. Switch to disconnect on record.	Yes, rotary level and tone controls Disconnected when recording.	No loudspeaker monitoring facilities provided	Yes, rotary level control. Left hand channel only
Headphone monitor on record and playback	Non-adjustable fixed level. Typically only 8Ω phones give sufficient level	Fixed level 8Ω Phones with own level control suggested. (Too loud on PWB 8Ω)	Ganged slider control for level. Range allows 8Ω to 600Ω phones to be used	Rotary level control Internal speaker disconnected when LH "phone socket" used. 200Ω plus phones
Headphone socket	3 pole ¼in Jack socket	3pole ¼in Jack socket	3pole ¼in Jack socket	2 DIN loudspeaker sockets
Mic Inout sockets	2 × 2 pole ¼in Jack sockets	2 × 2 pole ¼in Jack sockets	3 × 2 pole ¼in Jack sockets	Two 7-pin DIN.5-pin DIN-plugs can be used
Other input Output sockets	Phono and 5-pin DIN	Phono and 5-pin DIN	Phono and 5-pin DIN	5-pin DIN only
Built in or external mains power unit	Built in, lead supplied. Meter lamps show when mains power is used	Built in mains input provided with lead supplied	External power pack AD 550B supplied	Mains power unit can be installed in battery compartment



Nakamichi 550 cassette recorder

expected.

The JVC bias is judged as being correct for CrO2 and hence with the small change is too great for ferric. This again is borne out by the 3dB HF compression point for the latter.

This 3dB HF compression aspect may need some explanation. To the writer, this is precisely where reel-to-reel still scores over cassette. Frequency responses are usually measured at — 20 dB (or below) the usual peak flux. At higher levels the HF performance is less wide. But programme sources nowadays are much improved in their HF content. Record these wide range, high level HF content sources on tape and the better HF compression performance of a reel-to-reel system is evident. At 9·5cm/sec the reel-to-reel results are nearer the typical cassette figure.

The signal-to-noise ratio figures in the table are without the cassette machine's Dolby or ANRS noise reduction systems. All are judged to have a 10dB improvement when in use.

Finer points

The Uher has the worst mechanical noise, particularly at 19cm/sec. It is, however, of no consequence outside, but can be noticeable indoors when the machine is on a shelf. Also its 9·5cm/sec frequency response was disappointingly down at HF. Its other two lower speeds were of no interest in this report.

The Nakamichi has compensation for different tape sensitivities accessible at the rear. This ensures that the Dolby circuitry is operated at the correct levels.

The Sony and the Nakamichi have excellent peak limiters which prevent tape overload. These are a boon in microphone recording activities where the unexpected higher levels can occur. The dynamics are reduced, but this is preferable to tape overload distortion. Do not think of these fitments as an alternative to the proper use of the record level control or as automatic volume controls.

One aspect which I cannot allow to escape concerns the booklet on live recording supplied with the Nakamichi. This has words of advice on microphone recording with many illustrations, but there is not a sight of a crossed stereo pair! Little wonder Nakamichi justify their centre blend microphone input — to fill the middle because their left and right microphones are shown spaced! Its provision is a plus point, but more for use where a crossed stereo pair is assisted by an announcement mic, soloist highlight or particularly novel, for mono parabolic reflector use for bird-song recording. In this latter case we have used a Grampian parabolic reflector and fitted to it a single point stereo mic and mixed this with the parabolic reflector mics' signal in the recorder.

The Uher is described as the 4400 IC and is for quarter track operation. Model 4200 IC is for half track operation. The letters IC refer to the use of an integrated circuit to drive the internal monitor loudspeaker and loudspeaker sockets.

TABLE 5

Test	Sony	JVC	Nakamichi	Uher
Practical max. mic. input level (Details below)	6·6mV attn. 0 40 mV attn. −15 220mV attn. −30	1·4mV attn. out 9·6mV attn. in	7·2mV	12mV
Mic Pre-amp Overload	40mV attn. 0 230mV attn −15 1·25V attn. −30	57mV attn. out 1·6V attn. in	320mV	100mV
Noise contribution by mic pre-amp	65% of record level control travel	65% of record level control travel	75% of record level control travel	65% of record level control travel

TABLE 6

Test	Sony	JVC	Nakamichi	Uher
Record Mode current consumption	400mA @ 6V	150mA @ 9V	200mA @ 12V	500mA @ 7·5V

Choice of microphone

Sony supplied an ECM 99 one point stereo electret microphone. JVC supplied a similar type M201 and a cardioid mono eletret microphone M510 with two detachable capsules. One is the normal cardioid capsule while the other is a more directional 'interference' tube fitted capsule. Uher supplied two M534 moving coil cardioid microphones in a M634 stereo kit comprising table tripod and stereo bar.

For stereo use the ECM99 and M201 can successfully be hand held if care is taken. They are not particularly extended in the bass region. The M201 has bass cut switch for speech recording use. Both have been successfully windshielded using the recently published HFP design. The individual electret capsules have very good cardioid directional responses. The Sony capsule angle is wider than the JVC. The former's FET impedance converters are directly soldered to the electret capsule whereas the latter have a short length of screened wire for this, of necessity, very high impedance link. There is a suggestion of a dulling of transient response with the JVC, maybe due to this particular difference.

The JVC M510 with conventional cardioid capsule is quite a good microphone. A mesh windshield is supplied. For speech use bass cut is provided. The use of a Cannon connector at the mic end implies that balanced use is possible if the moulded in the lead two way jack plug was changed. Frequency response is smooth and wide and the noise level is very low. Very good cardioid response pickup.

Its interference tube additional capsule is of limited use. In bird-song recording, for instance, it in no way compares to the Grampian parabolic reflector addition to a directional or even omnidirectional microphone.

The Uher M534 microphones give a punchy sound, but have poor directional response and are very sensitive to handling noise.

Generally not enough attention is given to microphone choice and usage. We hope to return to this particular subject at a later date.

Summary of good points

One of our opening statements was that no one machine had all plus points. This neatly avoids us having to recommend this or that machine. Better that the reader decides, taking into account the price asked and pros and cons raised throughout this report. So from our not inconsiderable use for concert, drama, bird-song, trains, boats and sound effect recording, we see the plus points as being distributed as follows:

Relatively lighter weight and size of the Uher.
Nakamichi metering and three mic mixing.
JVC record level presets and large master ganged control.
Longer battery life with the Nakamichi and the JVC.
Optimised adjustments for particular tapes of the Nakamichi as supplied.
Overall performance superiority of the reel-to-reel system as exemplified by the Uher (with the exception of signal-to-noise ratio).
Overall value for money of the Sony.

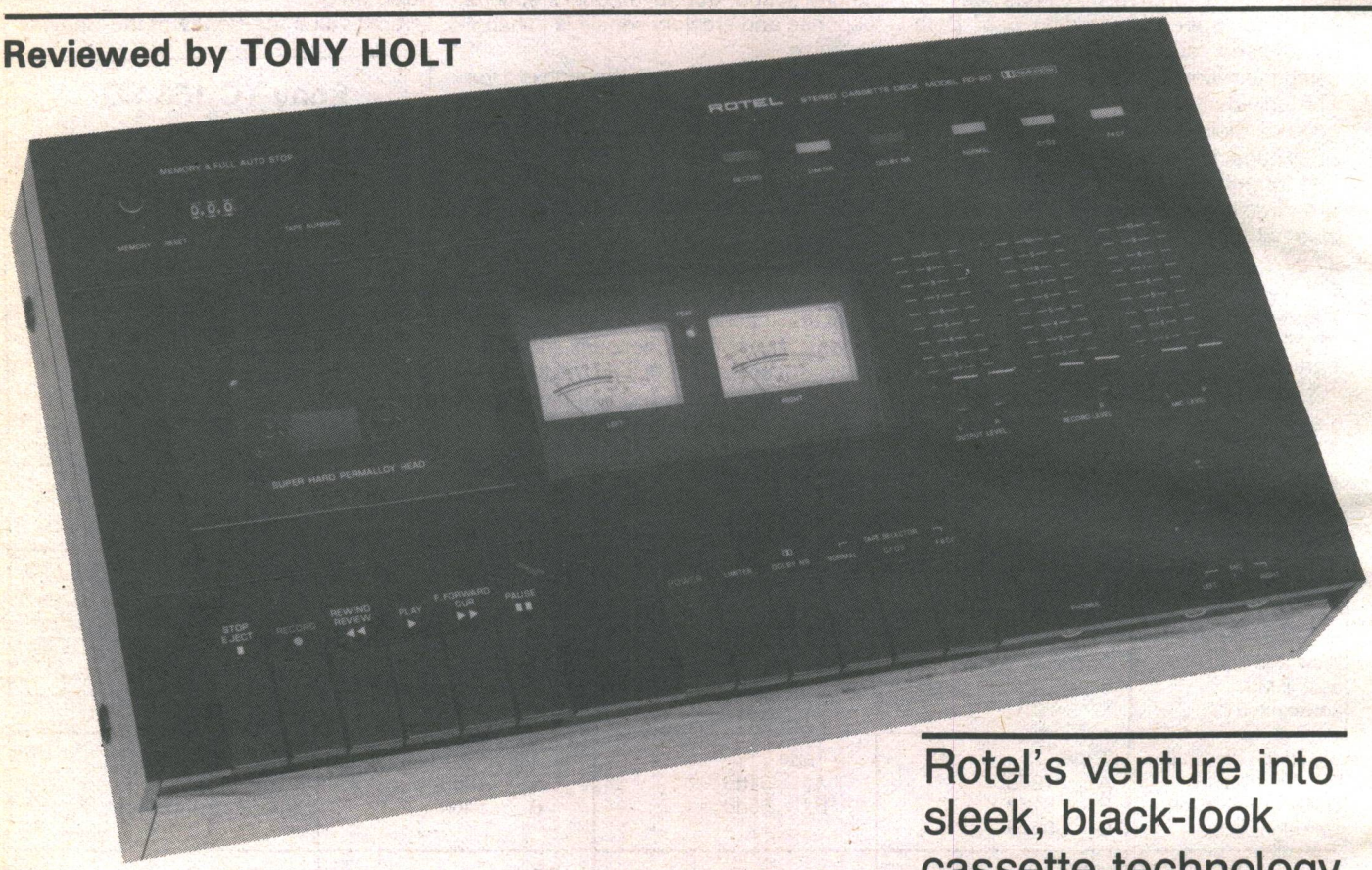
Sony TC 153 SD	£143
JVC CD 1635 B	£159
Nakamichi 550	£236
Uher 4400 IC	£325

TABLE 7

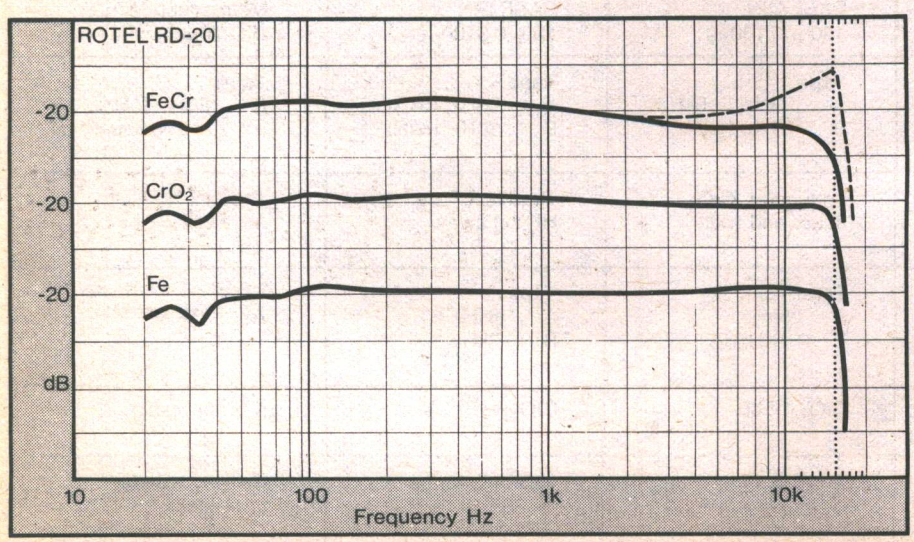
Feature or test	Sony	JVC	Nakamichi	Uher
Recommended tapes	A Sony HF B Sony CrO_2 C Sony FeCr	A Fuji FX B TDK CrO_2	A Maxell UD B TDK CrO_2	A BASF DP26
Wow and flutter peak RMS unweighted	0·12% on bench 0·13% around neck	0·13% on bench 0·13% around neck	0·1% on bench 0·1% around neck	0·08% on bench 0·08% around neck at 19cm/sec
Signal-to-noise ratio Ref 200 nWb/m. Dolby or ANRS off. Unweighted.	**Tape** A 49dB B 51dB C 52dB	**Tape** A 51dB B 55dB	**Tape** A 48dB B 54dB	**Tape** A 50dB (ref 320nWb/m)
Distortion (THD) 1kHz at above levels	**Tape** A 1·6% B 2·9% C 1·6%	**Tape** A 1·4% B 1·9%	**Tape** A 1·5% B 2·25%	**Tape** A 1%
Frequency response playback of standard test tapes	+2·5dB 31·5Hz −1dB 10kHz BASF DIN 120 + 3180μs	−2·5dB 31·5Hz −7dB 10Hz BASF DIN 120 + 3180μs	−1·25dB 31·5Hz +3dB 10kHz BASF DIN 120 + 3180μs	−0·25dB 40Hz +2·5dB 15kHz Metrosound M76 IEC 70μs
Frequency response record/playback −2dB points Dolby or ANRS OFF	**Tape** A 29Hz 12·5kHz B 29Hz 15kHz C 29Hz 15kHz	**Tape** A 29Hz 13·5kHz B 27Hz 16kHz	**Tape** A 30Hz 15kHz B 30Hz 15kHz	**Tape** A 20Hz 15kHz at 19cm/sec
Record/playback Frequency response. General trends	Well maintained flat and wide-all tapes	Both good. CrO_2 flatter and wider	Gradual LF and HF fall away	Gradual HF fall away
−3dB HF compression Ref. levels above	**Tape** A 7kHz B 8·5kHz C 5kHz	**Tape** A 5kHz B 7KHz	**Tape** A 8kHz B 7kHz	**Tape** A 15kHz
Bias increase for CrO_2 and FeCr	CrO_2 Nil FeCr Nil	CrO_2 1·5dB	CrO_2 4dB	Not applicable
Record level meter indication to produce ref. flux at 1kHz.	0dB all tapes	+3dB ferric	0dB both tapes	Halfway across total scale

ROTEL RD20 CASSETTE DECK

Reviewed by TONY HOLT



Rotel's venture into sleek, black-look cassette technology, Performance is not in the top class, but at £136 typical selling price it represents reasonable value for money



Performance at -20dB on three tapes.

The name Rotel has been fairly familiar to the British hi-fi buying public for a while now, mainly with a range of tuners and amplifiers distributed through the Rank Organisation. The RD-20 marks their entry into the cassette field, so we took delivery of this unit with considerable interest, wondering how it would succeed in this highly competitive area of the market.

First impressions are of a marked resemblance to the B & O 2200, but on closer examination the similarity is only

superficial. The meters are in the centre of the deck, with the cassette compartment on the left and the level controls on the right. The controls associated with the tape transport mechanism are in the form of a row of piano keys along the left-hand front edge of the unit, with another similar row of keys in front of the meters to cater for the various other functions — power on/off, limiter, Dolby and tape selection. Three pairs of slider-type faders are fitted — two for inputs and one for output. The use of separate faders for microphone and line inputs means that mixing of these signals is possible — a useful facility where a commentary is required between music tracks or other programme material. The output level control does just what its name implies, both whilst recording and playing back (the input signal is available at the output connections when in the record mode). Unfortunately the headphones output is at a fixed level, which could result in problems unless the phones are carefully chosen to match the equipment. The 8-ohm phones used for testing were far too loud at normal recording levels, although in fairness, this had been the case on quite a few other units previously reviewed. A row of six lamps to the rear of the level controls gives an indication of record, limiter on, Dolby on, and one of three types of tape, as selected by the key-switches already mentioned, with separate lamps for normal, chrome and ferrichrome. Switching for ferrichrome is becoming fairly commonplace nowadays, and to justify the higher cost of these tapes, improved performance should obviously be expected. However, on the unit tested, this was only the case when the normal tape position was used, where the boost between 10 and 15kHz was considered preferable to the gradually falling response from 1kHz obtained with the switch on ferrichrome. Too much treble can always be reduced later on, with the added bonus of a reduction in the noise level, and this has always been the situation on units not specifically equipped for ferrichrome operation.

Sony ferrichrome gave a slightly better HF response than Scotch, although with ferric and chrome tapes the difference between brands was minimal. The figures and graphs relate to the performance on the three types of Scotch cassettes — HE (ferric), chrome and Classic — and the similarity between them is immediately apparent. Apart from the point mentioned above about using ferrichrome on the normal tape position, there would seem to be little point in using anything other than a good LH tape in order to obtain reasonable performance.

As expected, the distortion figure was lowest on LH tape, although at 2·5% this was not particularly outstanding. This is, however, within the DIN hi-fi requirement (3%), but a figure nearer the 1·5% mark had been hoped for.

An LED, situated between the meters, gives a visual indication of any peaks of over +5dB in the recording level. The distortion at this level was found to be only just over 3%, so optimum results should be obtained if the input level controls are set to a point just below that which causes the indicator to flash occasionally. The meters, of course, are too slow to respond to sudden peaks, and if they alone are used, the levels might be set too high, giving a much higher level of distortion. The metering point is before the record pre-emphasis, and this must be borne in mind if the programme has a large (and loud) high frequency content.

The peak indicator also functions on playback (an unusual arrangement that I have not come across before), and advice is given in the manual on using this as a guide when setting the output level for minimum distortion. In practice the light flashed only if the tape had been recorded at too high a level in the first place, and no amount of adjustment was going to remove any distortion present under those conditions.

In an attempt to keep the distortion down when recording from microphones or other unpredictable sources, a limiter can be switched into circuit. In fact, severe clipping took place with the limiter in use, amounting to a measured 9% distortion for a 10dB overload and 15% for a 20dB overload. Even these figures are obviously preferable to the damage that can otherwise result from such overloads, but I have seen limiters on comparable machines that can take up to +40dB before clipping starts.

The signal-to-noise ratio, using LH tape, was 45dB (weighted), and with the Dolby noise reduction switched in a quite satisfactory 10dB improvement was obtained. However, a reduction in HF response was apparent under these conditions, lowering the −3dB point by as much as 2kHz and seeming to indicate the need for a more critical factory calibration of the Dolby circuitry.

Wow and flutter was very poor with an overall record/playback figure of 0·28% (peak weighted). This is well outside the claimed 0·1% — a standard which is not unusual on units in this price bracket, and is obviously an area where some improvement could take place.

A Ferrograph Recorder Test Set and Auxiliary Test Unit were used as the standard items of test equipment for all measurements.

Input and output signal connections are taken in the normal way to a 5-pin DIN and two pairs of phono sockets on the rear of the unit. The output level proved to be a very useful 890mV — sufficiently high for the output control to be of some use in matching the signal level from this unit to the other inputs on an amplifier. Standard jacks on the front of the unit are provided for microphones and headphones.

Cue and review facilities are incorporated, whereby the progress of the tape over the heads can be monitored whilst winding and rewinding. This arrangement can be fairly useful, but care should be taken to ensure that the output level or amplifier volume control is kept fairly low during this operation. A memory autostop is included, such that if the counter is set to zero before recording commences, the tape can be automatically rewound to that point later.

Conclusion

Recordings made on this machine were generally quite satisfactory, although some of the anomalies, particularly in respect of frequency response and tape selection, are clearly problems of design rather than quality control. However, the current discount price of around £136 represents pretty reasonable value for money for the standard of performance and facilities offered.

Parameter	Specification	Results	Comment
Frequency response			
(−3dB)			
Fe	30-15,000 Hz	20-15,000 Hz	
CrO_2	22-15,000 Hz	20-15,000 Hz	
FeCr	22-16,000 Hz	20-12,000 Hz	See text
Signal/noise ratio			
Dolby out	48dB	45dB (CCIR weighted)	Fair
Dolby in	58dB	55dB (CCIR weighted)	Fair
Wow and flutter	0·1%	0·28%(peak, DIN)	Poor
Distortion			
Fe		2·5%	Fairly typical
CrO_2		2·8%	Fairly typical
FeCr		2·8%	Fairly typical
Input sensitivity			
DIN	10mV	5mV	Adequate
Phono	66mV	77mV	Adequate
Mic	0·8mV	0·17mV	Adequate
Output level	650mV	890mV	Very useful
Channel separation	>40dB	42dB (at 1 KHz)	Good
Crosstalk	>55dB	>55dB (at 1 KHz)	Good
Channel balance	0·5dB	0·4dB (at 1 KHz)	Good
Rewind time, C-60	95 sec.	81 sec.	
Price	List £199.90	Typical £136	
Distributor	Rank Audio Products, PO Box 70, Great West Road, Brentford, Middlesex.		

MIXERS FROM MODULES

Two high quality mixers for the recording enthusiast By M.G. Skeet

From the enquiries received by our Advice service there is a steadily growing interest in mixers suitable for microphones or programme compilation. Moreover, the response to a recent short news item on the Partridge Electronics range of mixer modules confirms the demand for a few articles giving some details of some basis DIY mixers. We have this in mind, and three projects are best described by their specifications:

1) A four microphone channel plus one high level stereo pair, stereo output mixer. The emphasis is on low noise and other high performance aspects.

2) A programme mixer with stereo high level inputs and announcer's mic input. The emphasis is on convenience of operation and avoiding impairment of the quality of signals passed through it. This pair of mixers will be described together as they share many ideas and modules.

3) A six mocrophone channel to four channel output mixer with switching to give stereo output. The emphasis here will be to illustrate the use of the Partridge Electronics modular construction system.



In the June 1976 issue of HFP we outlined our thoughts on mixers. Figs. 1 and 2 respectively show a microphone mixer and a programme mixer similar to those described in block form in the introductory article. Both make use of various circuit modules and now we can give some details of these and other constructional aspects. It is not intended to give more than a general guide for we find that many people adapt ideas offered and detailed step by step procedures are largely wasted.

All the circuit modules require +24V DC, and an external power supply is recommended.

Microphone mixer specification

Four microphone channels and one high level stereo pair of channels are provided. Additional channels are easy to incorporate — apart from any individual channel circuitry, only a couple of mixing resistors for each extra stereo pair are needed.

The microphone channels are pan pottable to form two stereo pairs or one stereo pair plus up to two highlighting or soloist microphones. Panel mounted pre-sets are a boon and therefore are provided. These allow channel faders to be used 'full up'. The prefade listen (PFL) and output headphone monitoring is perhaps superfluous, so if you do not require this then omission is simple. In use, however, it can be handy to check *on* an individual channel's feed in a *multi-mic* set up.

A microphone mixer's basic signal-to-noise ratio and headroom for high microphone output signals rests with the choice of pre-amp. Special consideration will be given to these aspects — see the module description and specification sections.

The prototype mixer has been in regular use at live recording sessions of

orchestra, choral, organ, string quartet and similar sessions. Coupled mainly to Tandberg reel-to-reel recorders and used with Calrec CM 652D, AKG D202E and Lustraphone Stereo Ribbon microphones, no shortcomings have been noticed. Wide frequency range, low noise and distortion are the achieved aims.

Programme mixer specification and performance

There is in my opinion a crying need for a simple high quality programme mixer. Many people have record playing equipment, tuner and tape of various kinds, but they have no facilities to integrate it all and allow easy recording from any source with the addition, probably, or a mono microphone for announcing. Our design allows this.

Channels have panel mounted pre-sets so that a channel fader can be used at 'full' travel prior to operation. Prefade listen (PFL) is provided and is essential for skilled programme compiling as it allows discs and tape to be cued up as another source is passing through the mixer.

Unique, however, is another facility in our programme mixer. The microphone output feeds only to the recorder and not the room monitoring loudspeakers. The wearing of headphones throughout programme compiling is not essential as programme sources are heard as they are fed into the recorder. Isolating the mic feed, as described, means there is no howl round (acoustic feedback). If properly coupled in with one's equipment, no impairment of audio quality (frequency range, noise or distortion) should be noticed. Guidance will be given on coupling it up.

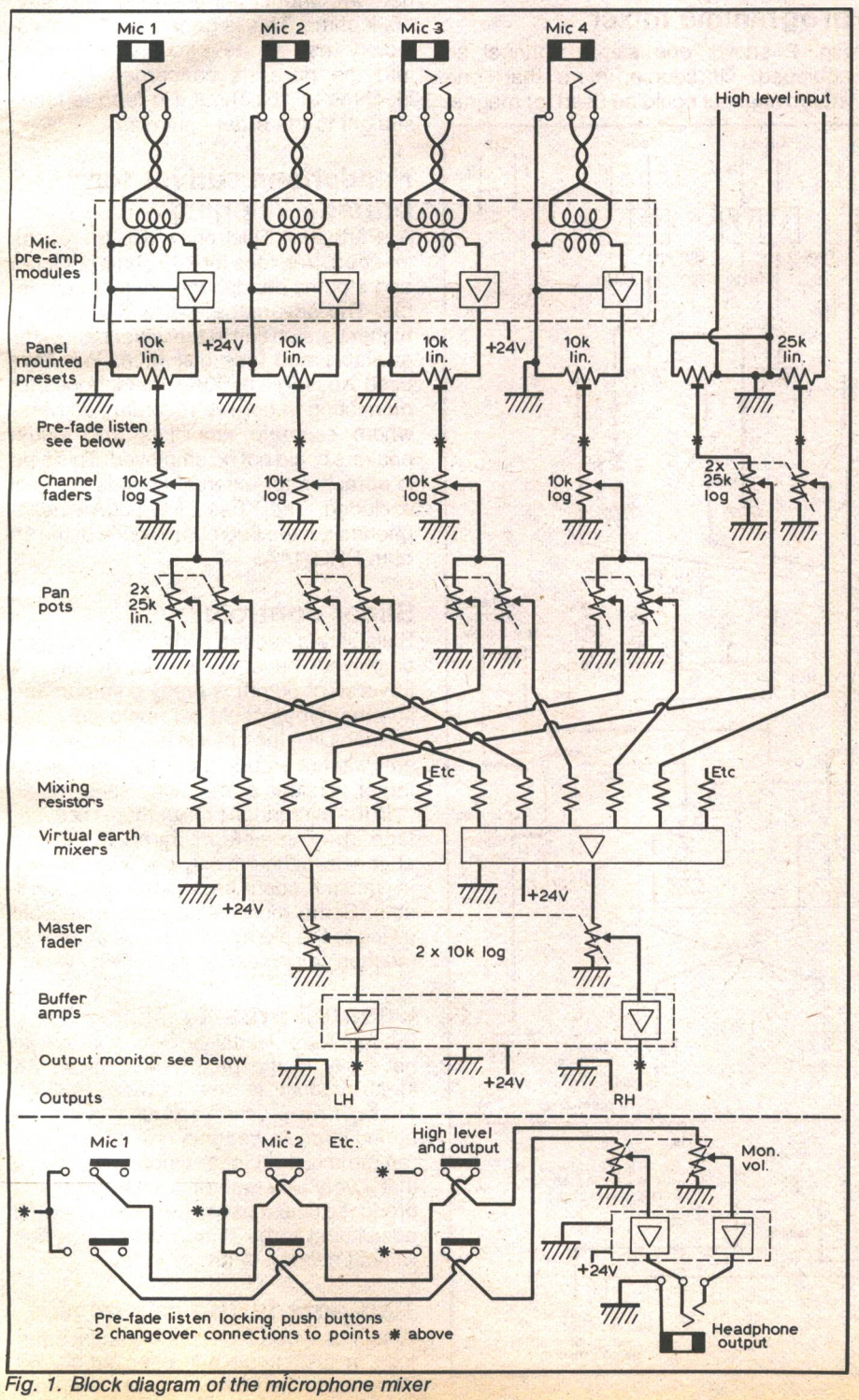


Fig. 1. Block diagram of the microphone mixer

Cabinetry, circuit modules and controls

Details of specifications and suppliers of the various items and modules are listed later. Initially, however, some thoughts on the choice of each of the items are offered and we start with the cabinetry.

Housing the mixer

As most of the modules are from the Partridge Electronics catalogue, it would certainly be possible to make use of their modular cabinet system. We have used this system for the quad/stereo microphone mixer to be described in a future issue of HFP and it can be thoroughly recommended. Details will appear in that issue and the Partridge catalogue.

The alternatives, as used in our prototypes are cheaper, but require more work; the affluent amongst us can skip the rest of this paragraph. The microphone mixer uses an aluminium box with a sloping front. This is available in three sizes — ours is in the smallest, and things are a little cramped so perhaps the middle size should be used. After cutting all the holes required (hours of drilling and filing) a reasonable finish is achieved by covering the control area with black Fablon. Some extra holes were cut in the alloy before it was covered with Fablon to allow for any extras that might be needed later on.

One of the photographs shows how internal accessibility is achieved. Note that the rear of the hinged panel has been cut and fixed across the base and sides to allow input and output sockets to be more conveniently installed. Our prototype programme mixer uses a wooden box with circuit modules in 4oz tobacco tins. The largest sloping front alloy box might be large enough as an alternative depending on the size dictated by the number of channels needed.

Microphone Pre-amp modules

The microphone mixer's requirements and the programme mixer's requirements are different. With the former an essential for moving coil microphone operation is the use of 'balanced' or 'floating' inputs by use of transformers. This is to avoid pick-up of stray electrical signals by the use of long microphone leads. The use of long leads is unlikely with the programme mixer.

For the microphone mixer great success has been had with pre-amps from two sources. Surrey Electronics produce a stereo pair pre-amp giving choice of 30, 200 or 600 ohms floating inputs by transformer tapping. In an earlier article by this author it was suggested that the primary of such transformer inputs should have a centre tap connected to earth. It seems that in professional circles this is not (always) done and indeed long screened leads have been employed with the Surrey pre-amp and absolutely no pickup has occurred.

The Surrey circuitry is extremely low noise in operation. It is very gratifying to be able to bring up a microphone level and not have hiss come up with the signal.

Skeleton pre-sets in a feedback path allow the gain available and the overload point to be tailored for the input levels we have encountered. The product is intended for the professional market and is supplied with a 12-way gold plated edge connector.

An alternative source with fixed input impedance, little loss in performance and lower cost is a stereo mic pre-amp from Partridge Electronics. Also available in kit form the single PCB accommodates both channels in the same way as the Surrey. It is, however, larger and this will perhaps influence the choice of mixer case. Provision is also made for a preset control in the feedback path to control the sensitivity and overload point.

For the less stringent requirements of the mono mic channel in the programme mixer another Partridge module is recommended. Details appear in the specification and supplier section later.

Virtual earth mixer

Partridge's excellent virtual earth mixer kit is employed here for both mixers. The mixing is at very low impedance, ie, virtually at earth potential, and hence no interaction between controls occurs. Additional channels are applied by one extra resistor per such channel. The value of the 'mixing' resistors determines the gain of the mixer.

It suited our prototype of the microphone mixer to have some 8dB gain at the mixing point, but this may be altered, within limits, depending on the sensitivity of the recorder.

For the programme mixer it is the intention to have zero overall gain from the point of view of high level channel input to output with all controls at maximum. This is achieved by suitable values of mixing resistors at the virtual earth mixers.

RIAA pre-amp for programme mixer

Fig. 2 shows one stereo channel so equipped. Of course, more than one stereo channel could be used for magnetic pickups. Partridge Electronics have a PCB kit and details are given later.

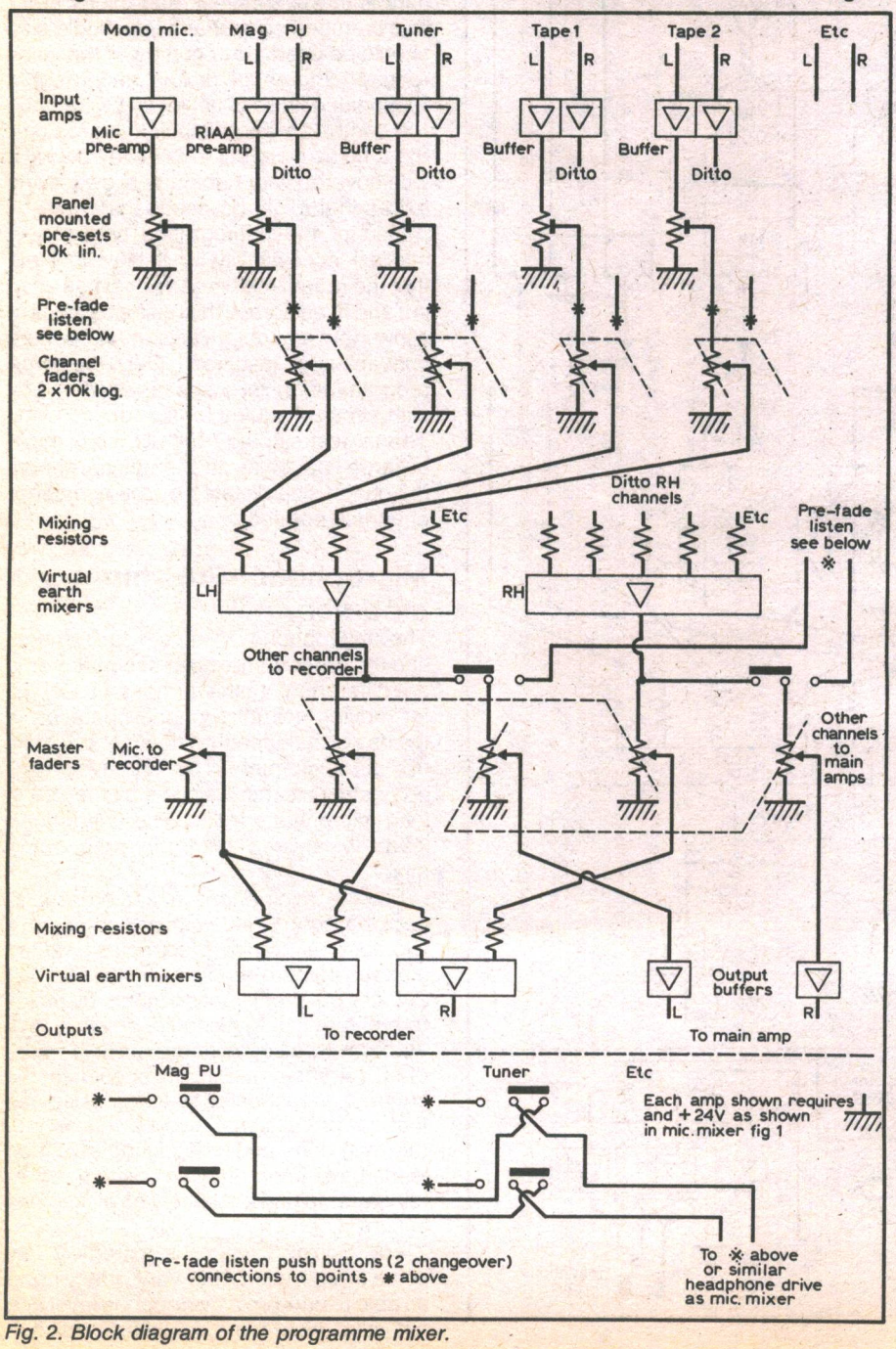


Fig. 2. Block diagram of the programme mixer.

Output buffers

It is not a requirement in either mixer to be able to drive at OdBm into a 600-ohm line, so the output stage can be a simple buffer or impedance converter. The Mullard publication *'Transistor Audio And Radio Circuits'* contains an excellent circuit. We cannot locate a commercially available kit or PCB, so a complete PCB design and circuit diagram are included here. Hints on PCB manufacture are also given.

Input buffers in the programme mixer

The Mullard circuit used as output buffers is ideal also as an input buffer. This is to get an input impendance of, say, 100k ohms. This is generally more satisfactory as far as circuitry connected into the mixer is concerned than the 5k ohms to 10k ohms if a feed is taken straight to the slider controls.

Headphone drive for prefade listening

A Partridge Electronics kit is recommended. Versions for 200 ohms or higher and 8 ohms headphone drive are available. The advantage of the 200 ohms or higher version lies in the wider bandwidth available and less distortion. We have used Koss PRO-600AA headphones for monitoring in our live recording activities where separate amplifiers and loudspeakers could not be employed. This type is attractive for external sounds are well excluded. The Koss PRO-600AA headphones are the 600 ohm version of the 16 ohm PRO-4AA.

Slider controls

Reliability is needed and the Egen sliders employed have given no trouble. A traverse of 58mm is pretty common and so other types could be employed.

Knobs like the ones in the photographs are without doubt the best, but avoid larger versions of the same style.

In the microphone mixer there is advantage in using stereo controls in the mic channels, although only one track is used in circuit. A spare track is therefore available. Some mono sliders are unreliable owing to the absence of the other track to mechanically balance the moving wiper.

Channel presets

Presets are certainly an operational necessity in the programme mixer. An ideal product is the Ruwido RollPot. These have proved very reliable over a period of some years in one of my programme mixers. Linear types are used so that a very slow rate of change of level is produced over most of the travel, enabling adjustment to be done during recording without sudden changes in level.

Pan-pots in the mic mixer

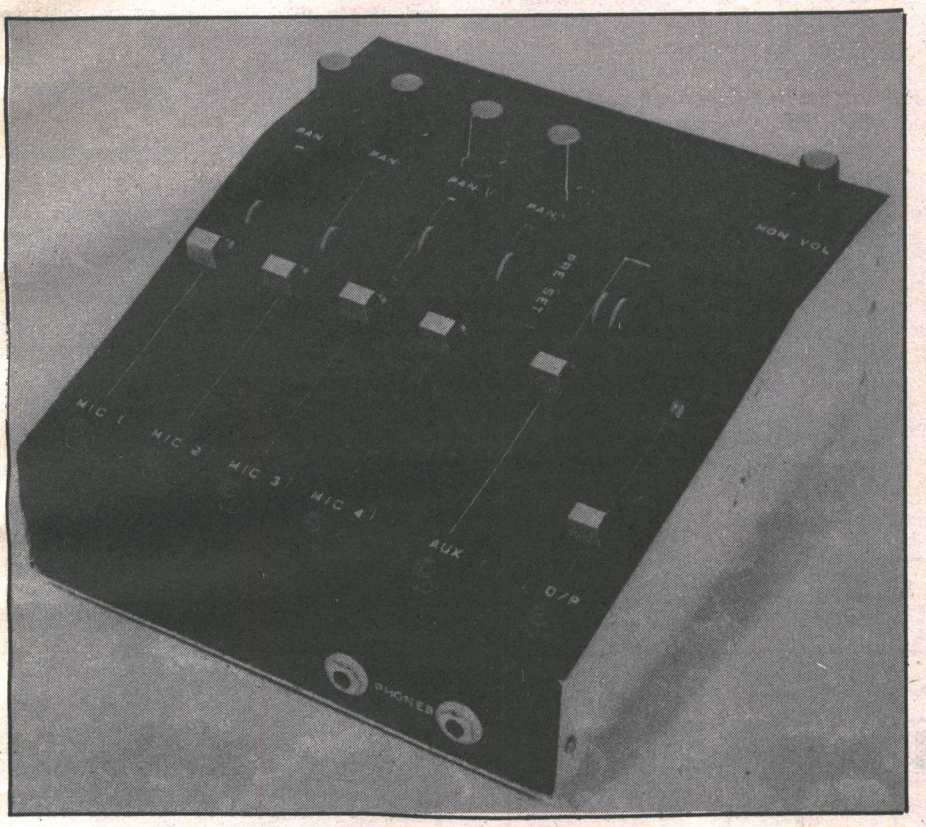
A special type of introducing no insertion loss in the circuit has been employed. They are called BALANS controls, each

track having a no-resistance part respectively to opposite input ends. Consequently there is no insertion loss in the control's mid position. Unfortunately, the original supplier no longer carries stocks. The alternative is a log/ antilog control, or, with more insertion loss, a ganged linear control.

Sockets

These perhaps largely depend on existing equipment. Two way ¼in. jack sockets and 5-pin DIN sockets for the outputs and high level inputs have been reliable and convenient. Phono sockets should be avoided as poor connections have occured.

In the microphone mixer we recommend 3-way ¼-in. jack sockets for the microphone inputs. Three ways are needed if floating or balanced inputs are used. Of course, the more expensive Cannon XLR and similar sockets can be employed, but using 3-way jack sockets has the advantage of compatibility with unbalanced mic inputs on 2-way jack plugs. You simply plug them in.



Completed mic. mixer. Note panel presets.

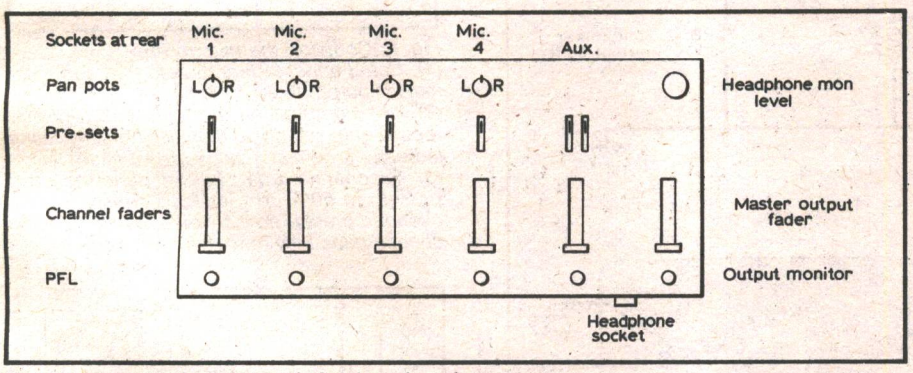


Fig. 3. Suggested panel layout for the mic. mixer.

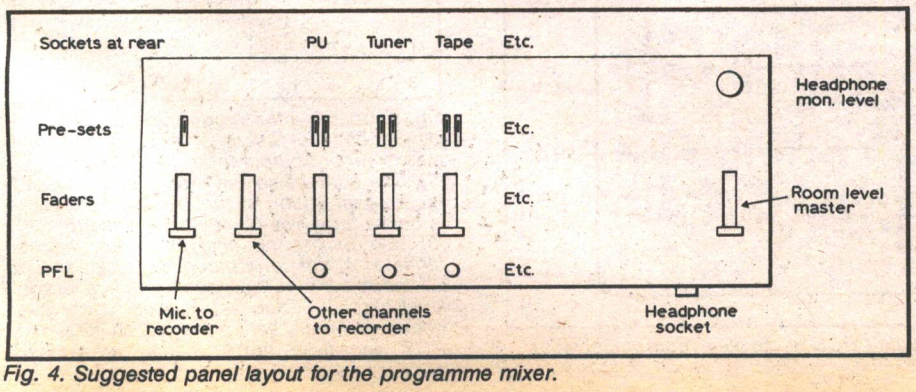


Fig. 4. Suggested panel layout for the programme mixer.

Pre-fade listen and output monitor push buttons

Two basic ways of accomplishing this were considered. One way was to have a bank of push buttons with mechanical interlock so that only one can be pressed at once. Alternatively, double changeover contacts can be used with linking as in Figs. 1 and 2. Previously operated buttons need to be released before another is depressed. However, if more than one is depressed there is no problem, the button on the right feeding a signal. The latter method was chosen to maintain in-line ergonomics on the front panels.

Power units

Mains to +24V DC, regulated, can be provided by various Partridge modules. A cabinet is available for separate installation.

PCB Module construction

The Partridge Modules and the Surrey Module are available in kit form or in assembled and tested form. In kit form, circuit and layout diagrams are supplied. The Partridge PCBs are versatile in that they are the same as used for other versions of the circuits (e.g, those with bass and treble controls). The unused component positions are simply ignored. In the case of the virtual earth mixers, C42, note that six wire straps are required. This is shown in the layout diagram supplied by Partridge to complete the circuit in the basic form this article is interested in.

In the case of the Surrey mic preamp it suits the present application better if the 15k ohms fixed resistor in series with the 100k ohms feedback preset is changed to 4·7 k ohms.

In case the standard resistor colour code is not known Fig. 5 illustrates the basics. A wholesome (unlike some) "aide memoir" is Bye Bye Rosie Off You Go To Birmingham Via Great Western. Another basic guide is given in Fig. 6 in case sorting out which way round slider pots should be installed is a problem.

Buffer and output construction

It is not difficult to make a PCB for the Mullard circuit. Alternatively Veroboard

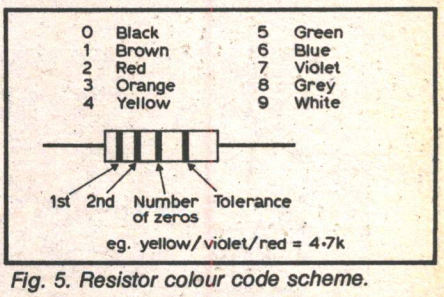


Fig. 5. Resistor colour code scheme.

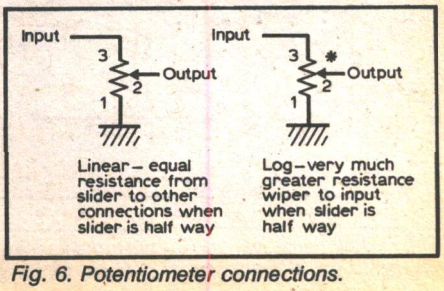


Fig. 6. Potentiometer connections.

drilled copper stripped board could be used. Fig. 7 shows the module circuit and PCB layout from the soldering side. Some copper clad board, an etch resist ink pen and ferric chloride etchant are needed.

The procedure is: (1) Cut to size the required number of boards. (2) Lay one on top of the other, copper side up and drill the four corner holes 4BA clearance. (3) Bolt together and using the layout in Fig. 7 as a template drill all the component holes with a small drill just large enough to take the component leads. (4) Separate the boards and use the etch resist pen to make out the circuit on the board, linking up the appropriate holes already drilled. (5) After the etch resist has dried, immerse each board in the ferric chloride solution. Follow safety precautions supplied with the product. Agitate from time to time. (6) After etching,it pays to 'tin' around each hole.

Installation of modules

One method is to use 4BA threaded pillars and mount the PCBs component side down. Leads are then easily soldered to the appropriate part of the printed circuit. Pre-testing of the board is advisable to avoid the frustration of later removal. If the Surrey microphone pre-amp is used in the mic. mixer then drilling two extra holes in its edge connector will aid similar style mounting.

Wiring

Inputs should be screened or kept as short as possible in length. Outputs should be kept as far from the inputs as possible. In practice, however, as low impedances are employed perhaps this is being over-cautious. Each module has a decoupling resistor and capacitor in its positive rail feed. Thus all +ve leads can be brought back to one point near the +24V DC input to the mixer. It is not favoured that the mains power unit be fitted in the mixer. Probable hum problems are not worth risking. Partridge, however, have some power boards with toroidal mains transformers with very low external magnetic fields.

The earthing or −ve feed and signal return have caused some problems in some of the author's previous mixers. My recommendation for the microphone mixer is that the earthing for each module is brought with the lead carrying the signal. Therefore, this 'earth' should come into the mixer from the recorder at the mixer output sockets and go to the buffer amp board. It carries on through the various stages as in Fig. 1 so that it arrives at the input sockets last of all. At only one point should it reach the mixer's alloy case — at the output sockets.

A similar treatment of the programme mixer's earthing interconnections is recommended.

CONNECTION TO OTHER EQUIPMENT

Mixers, by their nature, are used with a wide range of other equipment. Under this heading we want to discuss setting up processes, particularly the recorder and its sensitivity adjustment. This is to ensure that the mixer is used at optimum signal levels and introduces minimum hiss and distortion.

Taken to extremes, if the recorder's sensitivity were too great the mixer would contribute hiss. If the recorder's sensitivity were too low then there is a danger of not fully modulating the tape or particularly with the programme mixer, feeding too great a signal into the mixer and hence possibly increasing the distortion.

Coupling to the microphone mixer

Fig. 8 illustrates the three basic stages of setting the recorder's sensitivity. Much will depend upon the type of recorder and its facilities, but the end result should be the same — with all channel faders out and the output master fader 75 per cent up, the recorder's sensitivity should be such that the hiss coming from the mixer is less than that coming off tape. Checking with headphones is the most revealing test. Use of my version of the mixer with a Dolby B reel-to-reel recorder at 15 ips has shown that no problems should occur with equipment making less stringent demands.

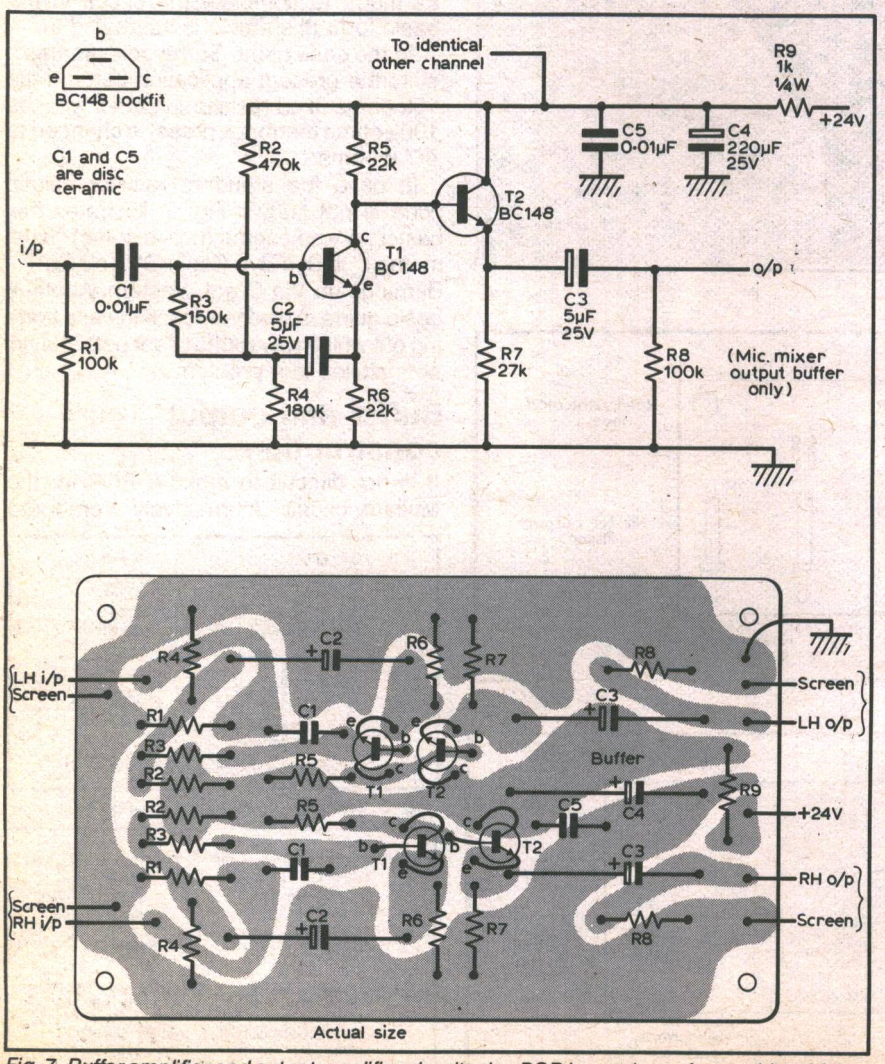


Fig. 7. Buffer amplifier and output amplifier circuit, plus PCB layout (seen from solder side). From Mullard's 'Transistor and Audio Circuits'.

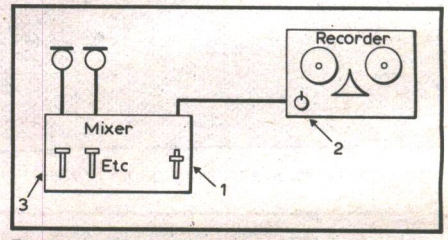


Fig. 8. Coupling the mic. mixer
(1) Set channel faders to zero (no feed). Set master output fader to 75% up.
(2) Use combination of input sensitivity and record gain setting so that hiss from the mixer is below tape hiss (Dolby on – if fitted).
(3) Set channel faders full. Set panel mounted presets to 50% up. Set PCB sensitivity and overload presets so that voice at one metre on chosen mics fully modulates the tape.

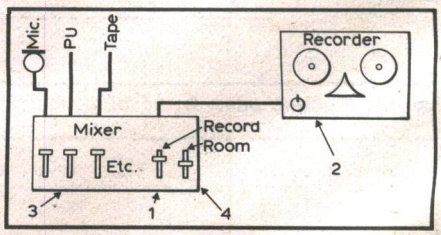
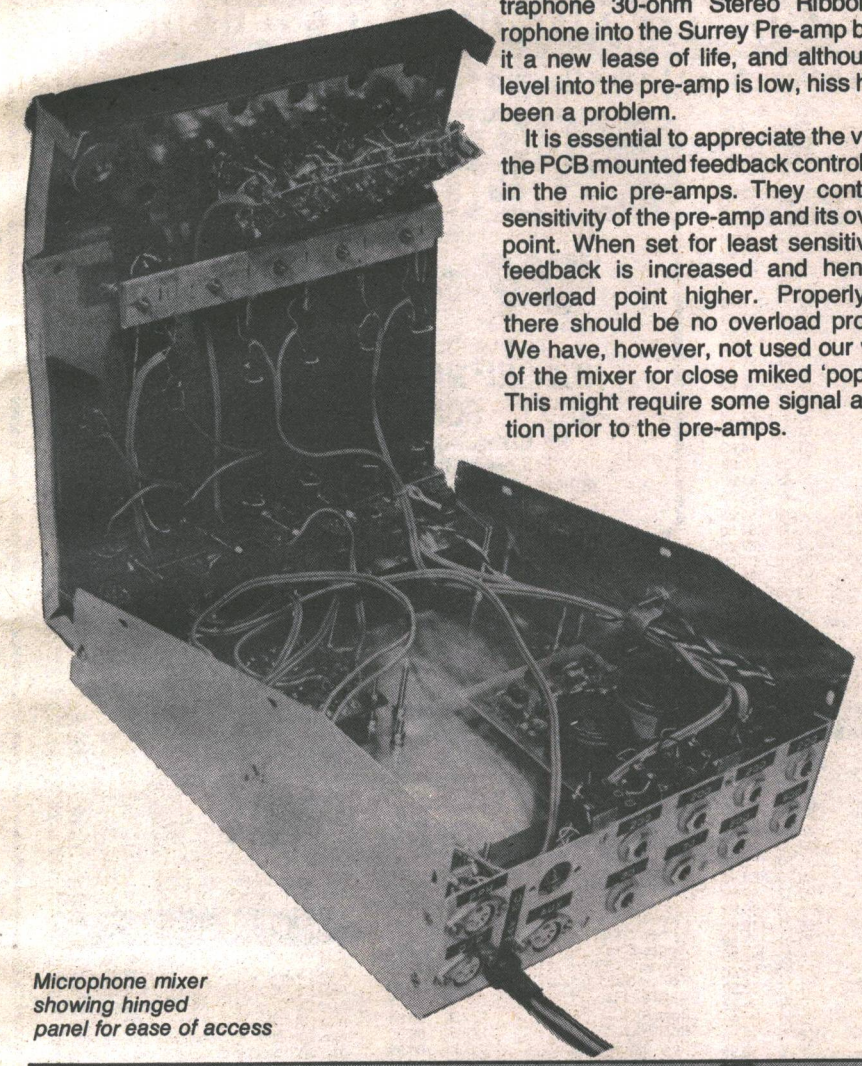


Fig. 9. Coupling the programme mixer.
(1) Set channel faders to zero (no feed). Set master record output fader to 75% up.
(2) Use combination of input sensitivity and record gain setting so that hiss from the mixer is below tape hiss (Dolby on – if fitted).
(3) Use pickup channel first. Set channel fader to full. Set panel mounted presets so that full modulation of tape occurs with 'average' level records. Then set up other high level channels. Finally set up the mic. channel (use PCB sensitivity and overload presets as appropriate).

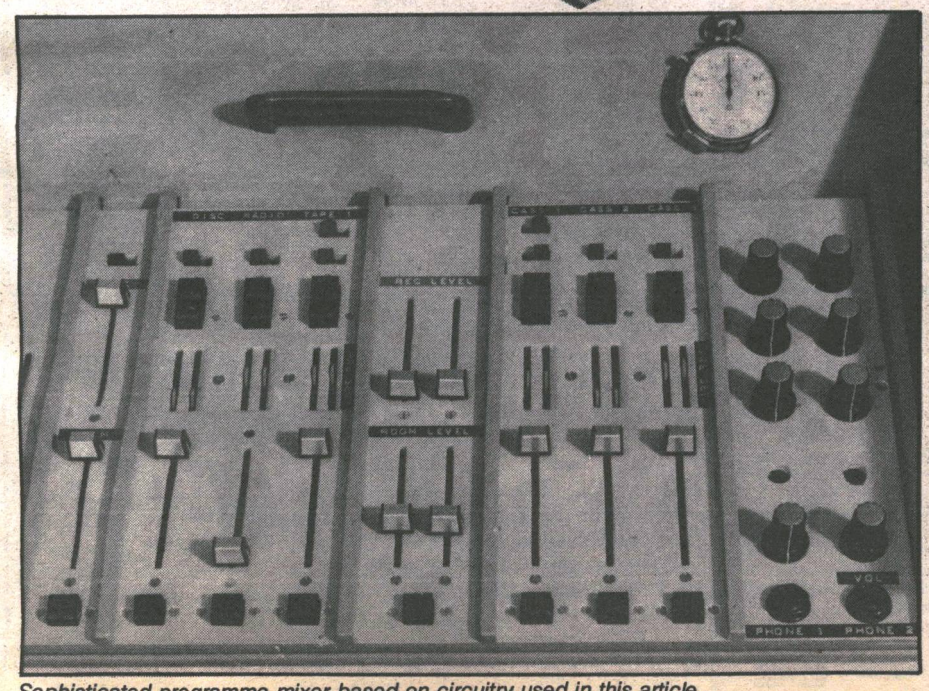
A necessary precaution is to ensure that an appropriate input sensitivity is chosen so that the record gain is not too low with consequential risk of recorder pre-amp overload. Similarly, with some recorders, having their record gain too high can cause their pre-amps to contribute hiss. Aim to work between 20% and 80% of the recorder gain control travel. In use this control is not touched as the mixer's ganged output control is used as the master fader. It is sensible to Sellotape the recorder's fader in the prepared position.

Having successfully set everything up as described it is now a fact that the overall hiss performance is determined by the quality of the mixer's pre-amp circuitry and the level of the microphone's output. Modern moving coil microphones, such as AKG D202s, fully drive both the preamp types used. Using an old Lustraphone 30-ohm Stereo Ribbon microphone into the Surrey Pre-amp brought it a new lease of life, and although the level into the pre-amp is low, hiss has not been a problem.

It is essential to appreciate the value of the PCB mounted feedback control preset in the mic pre-amps. They control the sensitivity of the pre-amp and its overload point. When set for least sensitivity the feedback is increased and hence the overload point higher. Properly used there should be no overload problems. We have, however, not used our version of the mixer for close miked 'pop' work. This might require some signal attenuation prior to the pre-amps.



Microphone mixer showing hinged panel for ease of access



Sophisticated programme mixer based on circuitry used in this article.

Coupling to the programme mixer

Fig. 9 shows the arrangement. Again it is a matter of setting the recorder's sensitivity to avoid the mixer contributing hiss. It is best to work to the demands of the PU channel, as this usually has the lowest signal feed capability. Remember to use the channel pre-sets so that the channel faders are fully up, unless a particular effect is required (i.e. low level for voice over announcements).

Difficulties

Without wishing to open the flood gates with enquiries the author is prepared to answer possible problems from genuine constructors, provided a stamped and addressed envelope is enclosed.

Suppliers, brief specifications and prices

The prices quoted, less VAT and postage, are necessarily a guide only. Check with supplier first.

Surrey Electronics, The Forge, Lucks Green, Cranleigh, Surrey, GU6 7BG.
Stereo microphone pre-amp: 30-200-600Ωmics; Floating inputs; 20Hz-20kHz within 0·5dB; Noise −120dB (VO.7); Distortion @ −10dB (VO.7) output 0·01%; 10mA @ +24V; 70 × 90 × 30mm; Kit £29.

Partridge Electronics, 23-25 Hart Road, Benfleet, Essex, SS7 3PB.
Stereo microphone pre-amp A34; 200-600Ω mics; Balanced inputs; 35Hz-18kHz ±1dB; Noise −92dB @ Max Gain; Distortion @ 100 mV output 0·25%; 8mA @ +24V; PCB 90 × 90mm; Kit £18.39.
Mono microphone pre-amp A17; 200-600Ω mics; Unbalanced input; 30Hz-20kHz ± 1dB; Noise −94dB @ Max Gain; Distortion @ 100mV output 0·02%; 4mA @ +24V; PCB 90 × 90mm; Kit £4.72.
Stereo virtual earth mixer C42: Mixes up to 12 inputs per channel; 20Hz-20kHz ±1dB; Noise −70dB @ Max Gain; Distortion @ 100mV 0·05%; 12mA @ +24V; PCB 90 × 90mm; Kit £8.20.
Stereo Magnetic Pickup pre-amp A74; RIAA Equalisation; Noise −88dB @ Max Gain; Distortion @ 100mV 0·025%; 8mA @ +24V; PCB 90 × 90mm; Kit £7.58.
200-600-ohm Stereo headphone monitor amp E12; 20Hz-20kHz ±1dB; +24V; PCB 90 × 90mm; Kit £9.07; E2 8-16-ohm; Kit £7.39.
+24V 200mA stabilized and smoothed power supply from 240V 50Hz mains supply; G35 Sub unit £10.04. G36 with module unit £13.71: G37 with cabinet £18.48.

Electroustic Ltd, 20 Wilbury Grove, Hove, Sussex, BN3 3JQ.
Ruwido roll pot. No 1071-000; 51mm overall 25mm travel. Enquire from Electroustic Ltd for price.

CT Electronics, 270 Acton Lane, Chiswick, London W4 5DG.
Aluminium Boxes with sloping panel: AB 20 8in. long 9in. wide, 3½in. high at back; 2in. high at front 8in. slope to front with PK Screws £2.20: AB21 as above but 10in. long £2.40: AB22 as above but 12in. long £2.60.

RS Components via component dealers
PFL Push buttons: 2-pole changeover 338-434, Single Mounting Bracket 338-248. Square or round buttons as required. Can also be fitted on a latching assembly.

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Pioneer SA9900	539.80	407.99
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Rotel RA712	134.50	95.99
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Sansui AU4900	144.57	99.99
Sansui AU5500	184.73	142.99
Sansui AU4400	114.72	86.99
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Leak 2060 1 Only	99.15	60.99
Leak 2075 1 Only	263.00	193.99
Pioneer CS313A 1 Only	39.18	28.99
Pioneer CS515 1 Only	89.08	65.99
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Pioneer HPM60 1 Only	126.43	93.99
Pioneer HPM100 1 Only	193.77	145.99
Rank Domus RD450 1 Only	special	50.99
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Sanyo SX2611 1 Pair	special	26.50
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Leak 2001	167.83	89.99
Leak 3001	131.09	93.99
Pioneer PL112D	80.76	59.99
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Rotel RT622	145.80	98.99
Rotel RT724	119.90	85.99
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Akai 3400	282.74	201.99
JVC VR5505L	125.00	119.99
Pioneer SX300	104.89	79.99
Pioneer SX450	156.33	118.99
Pioneer SX550	193.26	145.99
Pioneer SX650	271.26	203.99
Pioneer SX750	322.80	243.99
Pioneer SX850	430.44	324.99
Pioneer SX950	494.20	373.99
Pioneer SX1250	757.80	574.99
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BANDS



Polydor Super 2383 376

Rory Gallagher
The Story So Far

Ireland's greatest rock guitarist offers a formidable set culled from six Polydor albums including the favourite *Tattoo* and live sets *Irish Tour '74* and *Live In Europe.* Gallagher's talents have always seemed — most unfairly — to be overshadowed by comparisons with his better publicised fellows and his preference for small club venues. This album should set the record straight but I'd advise you to get the *Tattoo* album (2383 044) from which this compilation's best tracks come. They're *Cradle Rock* and *Who's That Coming* and not to be missed. **MS**



Casablanca NBLP 7025

Kiss
Destroyer

One might imagine that it would take more than bizarre make-up and repulsive stage tricks (like appearing to produce a trickle of blood from one's mouth and allowing it to flow down one's chest) in order to gain instant notoriety and a lot of money. After all, Screaming Jay Hawkins and Ditto Lord Sutch were doing it a long time before Alice Cooper and the current wave of nausea-rock. Kiss, however, seem to demonstrate that a well-presented image (thank you, Faralla, Woltag and Munao, Inc., public relations consultants) is as important as, if not more important than, originality or even musical ability. We cannot say from personal experience whether Kiss are as disgusting/entertaining on stage as is claimed, but on record they are neither. **RC**



Epic EPC 81321

Argent
The Best Of Argent
An Anthology

If anyone can explain to me why Uriah Heep have sold seven milllion records all over the world while Argent have never quite made the big league, I'd be suitably grateful. For even at their least charming (which includes, for me, tracks like *Thunder And Lightning*) Argent use the same kind of melodic and production tricks, and do it better. Whereas on the rightly popular *Hold Your Head Up,* for example, the combination of those insistent chords and that magnificently plaintive melody line take them onto a completely different plane. For those, like me, who like the band but have never got round to buying all the individual albums, this collection is an excellent compromise. **IES**



Capitol ST-11493 £2.99

Slick Band

Earl Slick was Bowie's guitarist after Ronson. The band is guitar, bass and drums and Jimmie Mack singing and writing most of the songs. The music is English rock and roll filtered through New York, and this time the main original source is Free. It's powerful, articulate, declamatory, melancholic in that rather macho way, and it gets by without distractions like keyboards or too many chords. But unlike Free, or for that matter Bad Company, they have an amazing guitarist: Slick himself. What he plays is nothing very innovatory, being school of Beck, but is done with great economy and authority. Words, playing, everything, this record makes most of the rest of the review batch this month sound unnecessary. **RB**



Philips 6308 261 £2.85

Frogmorton
At Last

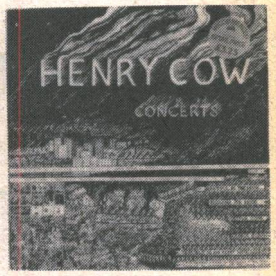
First album from an electric folk band that has built up quite a following in its five or six years on the road. Despite the denials in the sleeve notes, Frogmorton are a bit of a poor man's Steeleye Span, but without the edge of toughness which attracted rock audiences to Steeleye's music in the early trailblazing days. Instrumentally, they've got quite a bit going for them. But the vocals suffer from the characteristically hectoring tone of so many folk club graduates, which is likely to put off anyone who is not a fan already. **IES**



Polydor Super 2383 387 £2.95

The Dubliners
A Parcel of Rogues

If it hadn't been for two accidental Top Twenty hits a few years ago with *Seven Drunken Nights* and *Black Velvet Band,* The Dubliners could well have become first cult figures and then massively popular with a truly broad public. After all, in terms of sheer skill, intelligence and faithfulness to their ethnic traditions, they're just as eligible for the part as, say, Bob Marley and the Wailers. Perhaps it's just that Dublin's closer, and therefore less romantic, than Trenchtown. As things have turned out though, this varied and craftsmanlike exposition of the best of Irish music will probably only ever be heard by the committed folk fans. It's subtle, tough and delicate, played with style and passion and enormous technical expertise. No ranting, swilling, fake Irishness — just superbly controlled musicianship, wry harmonies and gutsy, evocative songs **IES**



Caroline CAD 3002 £3.25

Henry Cow
Concerts

Two sides are live versions of songs and other bits of music which, largely, have been previously recorded. There are differences of emphasis — their stage approach is almost probably workmanlike — but, apart from being good to hear, the recordings don't add anything substantial to the Cow corpus. The other two sides are live free improvisations. Henry Cow improvise in a unique lucid way. They never fall back on pyrotechnics or mere speed, they have remarkable mutual sympathy and they're all excellent technicians. Real free improvisation like this is harder to listen to than formula music, especially formula free improvisation, because there are always new things to cope with. This is all well worth the effort, but side four more than side three, where concentration seems to have wandered a little. If your concentration wanders, just listen to the drums. No one has drummed as articulately as Chris Cutler since Ed Blackwell's heyday. **RB**



Warner Brothers K 56236

America
Hideaway

It was a reasonably good bet that America would be the first act to record a track called *Watership Down,* and an equally good bet that they would instill it with a sentimentality and coyness absent from the book. Millions of people lap America up, I know; but this won't stop me thinking that they are weedy wets, incapable of stirring up any sort of real feeling with their music. George Martin produced. **TP**

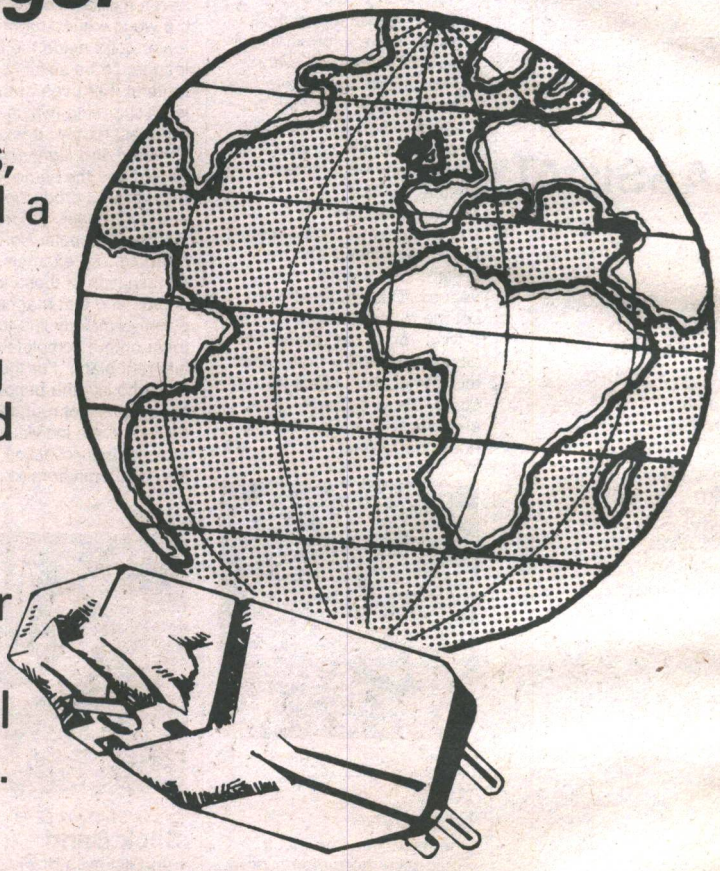
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Sergio Mendes and Brazil 77

Home Cooking

Brazil '66 has become Brazil '77. It's more funky, and there's evidence, naturally, of the revolutions in recording techniques and the use of synthesisers since Mendes' U.S. hits of the '60s. Two ladies do most of the vocals, very nicely, sounding almost at times like an insane Latin Abba. Arrangements are busy but not fussy, with lots of appealing percussion and great keyboard work by Sergio himself. No masterwork, but good fun. **TP**



A&M AMLK 64581

The Carpenters

A Kind Of Hush

OK, so it's already a hit: thousands of dedicated fans will already have bought it before this appears in print. But it's also an album which deserves to be heard even by those who are not normally susceptible to Richard and Karen's cleancut charms. Like that other slick American duo, the Captain and Tennille, the Carpenters have a touch of genuine class that helps them take your prejudices by surprise. Richard Carpenter's sharp, intelligent arrangements even manage to redeem the title track — surely one of the most banal tunes ever written. But, for the unbiased listener, it is Tony Peluso's subtle, beautifully poised guitar that lifts the whole album. He really does have that quality of tactful, incisive rightness which used to be the sole property of George Harrison. And when this is linked with Karen Carpenter's increasingly flexible voice on a track like Randy Edelman's *You,* the result is pop music of the highest order. **IES**



Arista Records ARTY 131

Fool's Gold

With production by Glenn Frey and Joe Walsh this promises to sound not unlike the Eagles. And not unlike the Eagles is just how Fool's Gold do sound. Bearing in mind that Tom Kelly, Denny Henson, Ron Grinel and Doug Livinston are individuals in their own right and hard-working musicians to boot, surely it behoves the fair-minded reviewer to say more than that they sound a bit like the Eagles, I hear you cry. Yes, surely it does, but what? If new bands keep turning up trying very hard to sound like the Eagles, but with nothing particularly interesting to offer by way of songs what can they expect? **TP**



Contour CN 2004

The New Seekers

Beg, Steal Or Borrow

If ever I noticed a Freudian slip on a record sleeve, this must be it: *Beg, Steal Or Borrow* is referred to as "a close second in the 1972 Eurovision Song Content". Content, of course, musical and lyrical, was never what the New Seekers were about. Yet their two biggest hits, *Beg, Steal Or Borrow* and *You Won't Find Another Fool Like Me,* each sold well over a quarter of a million records. And even the strangely muddy recording quality didn't hold them back. Both are included here, along with *Cincinnati,* a gentle Bee Gees-flavoured song which was probably the most sophisticated number they ever recorded, an appallingly sloppy *Your Song* and eight more amiably forgettable routines. **IES**



UK super UKAL 1021

Sound 9418

Sound 9418 is yet another brainchild of the irrepressible Jonathan King, aided and abetted this time by MOR arranger Johnny Arthey. Modestly described in the sleeve-notes as "the first new musical concept for quite a time", it seems to consist of a bunch of session musicians trotting through a string of well-known standards, tarted up with the most doggedly perverse arrangements King and Arthey could dream up Much of the basic material is plundered from the Glenn Miller heritage, which, Heaven knows, has suffered enough indignities over the years without Mr King's reggaed-up *In The Mood* and wah-wahed *Chattanooga Choo Choo.* Similar violence is done to *Stranger On The Shore, American Patrol* and others, though a minor hit of the Sixties, *Everyone's Gone To The Moon* gets an unexpectedly grand and sensitive arrangement. The notes explain that 9418 is Mr King's phone number, hence the name of the project. In view of the preposterous musical doublethink underlying this new "concept", it's probably more significant that it's an anagram of 1984. **IES**



EMI Harvest SHSP 4055 £2.99

Strapps

Here's a new group whose lyrics are so full of hip nastiness, whose lead vocals are so painfully contorted, whose looks are so mean and arrogant and whose rhythms are so like those of a rogue threshing machine, that they cannot fail to become hugely successful. With all these things going for them, the fact that the sound they make is unbelievably unpleasant should be no hindrance at all. **TP**



Capitol E-ST 11464 £2.99

Paris

Paris is essentially Robert Welch, who was Bob Welch with late-middle period Fleetwood Mac. He wrote the songs, sings them, and although Paris is a trio, there is more of his guitar around than could be managed without some trickiness in the studio. It is in fact very much of a studio album. The framework, breathless songs, rather given to femmes fatales, with power chords as much as tunes, is considerably enhanced by the production. The power chords are very precise and everything shimmers in a slightly distant way. Welch, quoted in the press release, talks about doing rock and roll with Gucci's on. That's a slightly clinical ambition, but more or less achieved, on record anyway. **RB**



Bell BELLS 263 £2.76

Hello

Keeps Us Off The Streets

If you try to pin down what was special about groups like the Small Faces, the Kinks and the Who, before they became respectable, there's only really one answer. They were all bolshy little kids who got a big kick out of making big, electric noises and annoying the neighbours. You could feel the sheer pleasure of chunking out vastly-amplified block chords and thundering away on your first Ludwig drum-kit. Hello have that same approach — crude, naive and genuinely enthusiastic. This album, their first, is largely a tribute to the style of the Sixties and the shrewdness of producer Mike Leander. Besides their first UK hit, *Tell Him,* it contains a whole batch of remakes of great one-off hits of the past: Jim (P.J.) Proby's *Hold Me, Shakin' All Over, Carol* and even *Let's Spend The Night Together,* all done with great good humour and lack of subtlety. Throw in their own teenage anthem, *Another Schoolday* and Russ Ballard's *Star Studded Sham* and you have a set worthy of Ready, Steady, Go in its heyday. Than which, in my book, no praise can be higher. **IES**

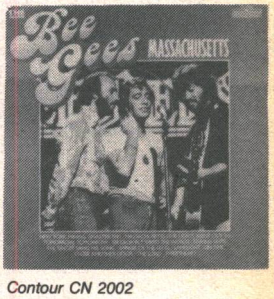


RCA RS 1040 £2.99

Pure Prairie League

If The Shoe Fits

This is PPL's fourth album. Somehow I managed to miss the first three altogether, but having heard this I'm very sorry that I did, for they make a lovely noise. Somewhere between the sleek efficiency of the Eagles and the enthusiastic amateurism of the Ozark Mountain Daredevils, these boys impart a remarkable amount of warmth and sensitivity to some very pretty songs, all originals except *That'll Be The Day,* at which they take a fairly good stab. The vocal harmonies are distinctive and superbly performed. Weak point is the lyrics, but they're not bad enough to spoil a very likeable album. **TP**



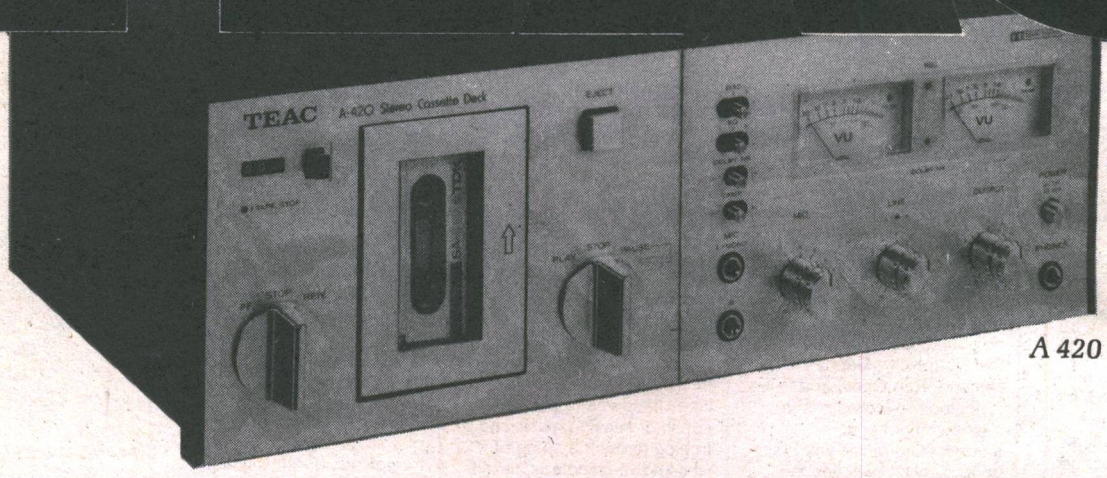
Contour CN 2002

Bee Gees

Massachusetts

This excellent compilation collects Bee Gees tracks cut in '67-'70 and '72 and highlights a career which seriously rivalled the Beatles in popularity. The pensive, slightly laid-back harmonies of the brothers Gibb offer the softer sound of popular music combined with unforgettable melodies and thoughtful lyrics. *Massachusetts* and *New York Mining Disaster 1941* remain classics and deserve another run in the singles stakes. **MS**

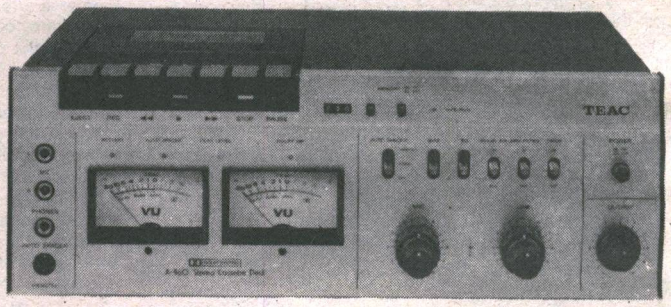
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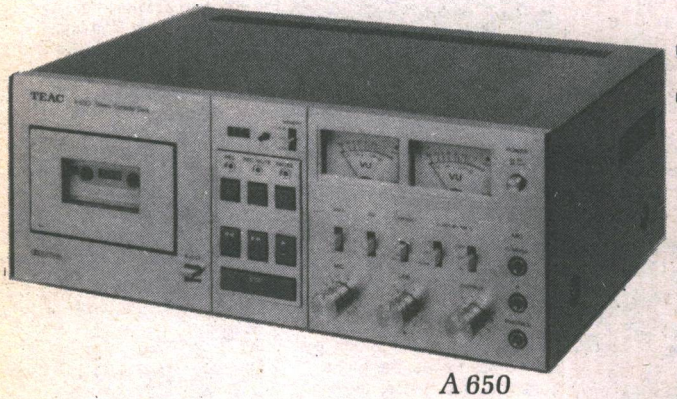
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Memphis Horns
High On Music

Their first album finds this legendary horn section playing some of the punchiest cuts around. The music — largely by hornmen Lewis Collins and Andrew Love — has muscularity and relentless drive which packs soulful funk and jazz soloing into the tightest of grooves. *Get It Up* and *Freedom Train* in particular are zesty enough to ensure audience participation — and ultimate exhaustion — by joining in on the nearest drummable or toe tapping surface. **MS**



A&M AMLH 64563

Charlie And The Pep Boys
Daddy's Girl

Since the great success of Aerosmith, stealing things from the Stones is apparently becoming a growth industry. This lot do pastiches of the Stones circa *Sticky Fingers*. They're got the voice quite well, but the band as a whole is on the vapid side. When not ripping off the Stones they do what can only be described as novelty numbers. Recommended for people who like Mick Jagger impersonations and other funny voices. **RB**



Bell SYBEL 8004

Slik

The best tracks on this album are the group's schizophrenic first single *Forever and Ever* and its redeemingly jokey follow-up *Requiem*. The worst is their sledgehammer assault on *When Will I Be Loved*. In between, they are revealed as an immature band, with some promise in that they at least have some energy and sense of rock drama noticeably lacking in their more established compatriots, The Rollers. As things are, Slick they're not, with a weakness in the singing and songwriting departments which all Phil Coulter's production tricks and the band's brilliantly calculated look-alike image cannot quite conceal. **TP**



BELL BELLS 264

Glitter Band
Greatest Hits

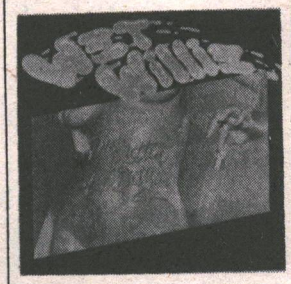
With Gary retired and these lads now calling themselves the G Band this album ranks with Gary's own greatest hits package as a tribute to seventies pop/rock music at its best. The talents of producer (and ex-Animal) Mike Leander in delivering the most consistent and recognisable of overall sounds plus the Glitter Band's late acceptance by out and out rock critics as being highly talented gentlemen makes this set a must. Hits include Angel Face, Just For You and Let's Get Together Again. Don't miss this hits package. **MS**



Caribou CRB 81267 £2.99

L.A. Express

The only bit of non-essential information on the sleeve is a line from Thoreau: "In wilderness is the preservation of the World." This is surprising because the music itself is as unwild, as urban suave, as you could imagine finding. It's the sort of music the rich baddies in Colombo play to each other before their comeuppance comes up. It's not actually all electric — saxophonist David Luell has evidently replaced Tom Scott — but it has that sound. Veteran keyboard player Victor Feldman is the main person. It's nice enough but it would be more visceral if they took Thoreau's message to heart. **RB**



Capricorn Super 2429 137 £2.95

Wet Willie
The Wetter The Better

This record is a bit uneven. Half is what you expect from a Capricorn band, boogying and amiable, not unlike what the Stones sounded like when they'd just come across Jim Price and Bobby Keyes and all those people. There are also three songs by newcomer Michael Duke which are altogether more excited, not to say shrill, more Arkansas than Allman and more in keeping with the spirit of the cover. Whichever, there are already records very like this one. Whether you buy it really depends on what you think record collections are all about. **RB**



Chelsea Super 2306 111

Chelsea Charbusters

This is the Kenny Nolan — Gene Page sound of Jim Gilstrap, Disco-Tex, Linda Carr and Lulu ensnared by some of the Funkiest thump ever grooved on to vinyl. Gilstrap's *Swing You Daddy* remains one of the Seventies ace soul productions: Linda Carr's *Highwire* one of the sexiest; and Disco-Tex's *Get Dancin'* one of the most infectious. Add to these the Bowie/Ronson production of Lulu's *The Man Who Sold The World* and you've got an album where 11 of the 12 tracks made the U.K. charts — deservedly. **MS**



EMI Capitol E – ST 11510 £2.99

Broken Glass

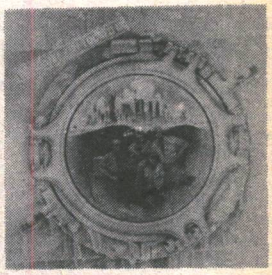
Stan Webb is one of the great old wild men of British Rock, perhaps not quite a legend in his own lifetime but working on it. You don't really expect originality from him, and you don't get it on this debut album from his new band, which also contains Robbie Blunt, Rob Rawlinson and Mac Poole, with a little help from Miller Anderson. What you do expect is good solid rock music and no nonsense, and this is what you get. Stan's in very fine vocal form, and the band are punchy and confident while keeping the ability to bring it down for a bit of contrast. Tony Ashton produced. Well done all. **TP**



RAK SRAK 520

Smokie
Midnight Cafe

Smokie play very competently, and the two hits included here, *Something's Been Making Me Blue* and *Wild Wild Angels*, aided by strong Chinnichap production, have some power. Alan Silson's guitar work is inventive and clean, and on the track which he sings he at least sounds like a real chap doing his thing. But for the most part, Chris Norman's voice, though well-groomed, remains so irritatingly rooted in the one mood of croaky desperation, the vocal harmonies are so much processed as not to sound like humans at all, and the whole thing is so much a machine-turned product that *Midnight Cafe* has a sterilised air. **TP**



MCA MCF 2750 £2.99

Wishbone Ash
Locked In

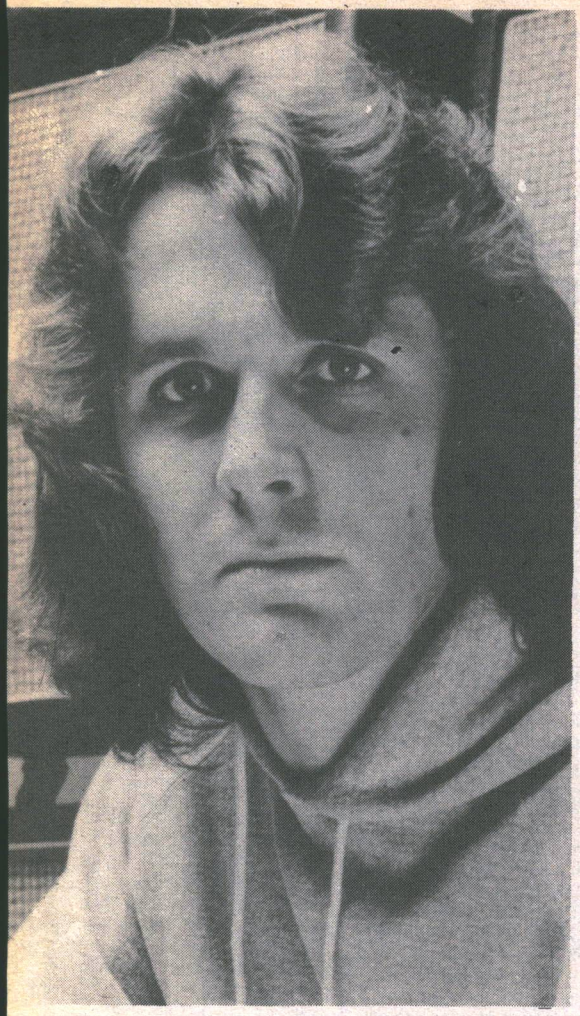
Wishbone Ash's strong suit from the first has been their imaginative guitar duetting, and this aspect of their music has if anything been made even more impressive since Laurie Wisefield, formerly of the excellent Home, joined the band. But his arrival has done nothing to put right Ash's weaknesses: their unconvincing vocals and apparent inability to construct pieces of music, as opposed to slabs of the group doing its thing. Mind you, Wishbone Ash's thing is a lot better than many other bands' things, and this album does have an astonishing variety of splendid guitar picking on it. But it would be nice to hear them come up with a few real songs. **TP**



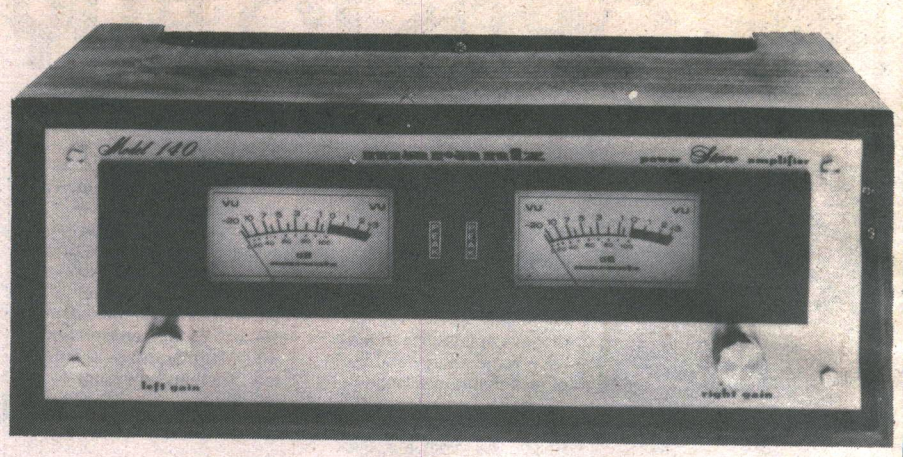
Bronze ILPS 9356 £2.99

Collosseum II
Strange New Flesh

The first Colosseum was an important part of the Sixties because it had really good musicians, because it anticipated some of the good things in jazz-rock and because *Valentyne Suite* itself struck a chord. Nothing more inherently significant though. Colosseum II inherits only Jon Hiseman of the musicians; the others are ordinary enough. There's a lot of funny keyboard, gelatinous guitar, and the songs continue in the vein of those Hiseman did with Tempest. They're flowery but inarticulate, snug, to make things worse, with a degree of overkill by Mike Starrs. A sad record. **RB**



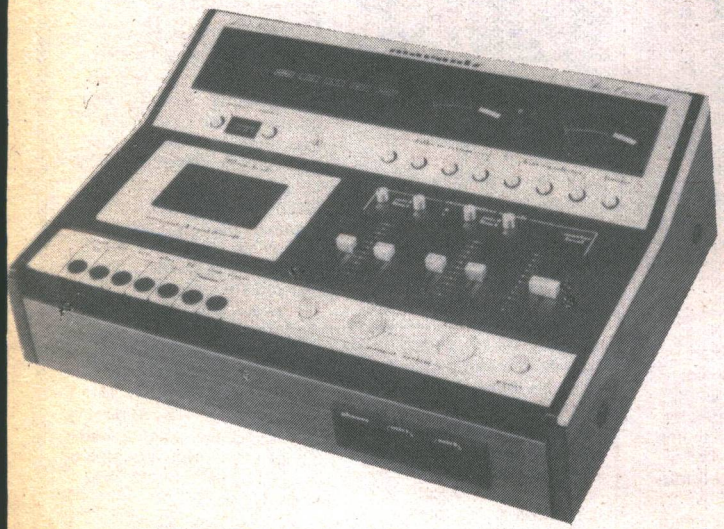
John Wetton, once bass guitarist with Uriah Heep, chose a Marantz system. He says 'Music and the fidelity of sound reproduction are extremely important to me. That, simply, is why I use a Marantz system.'



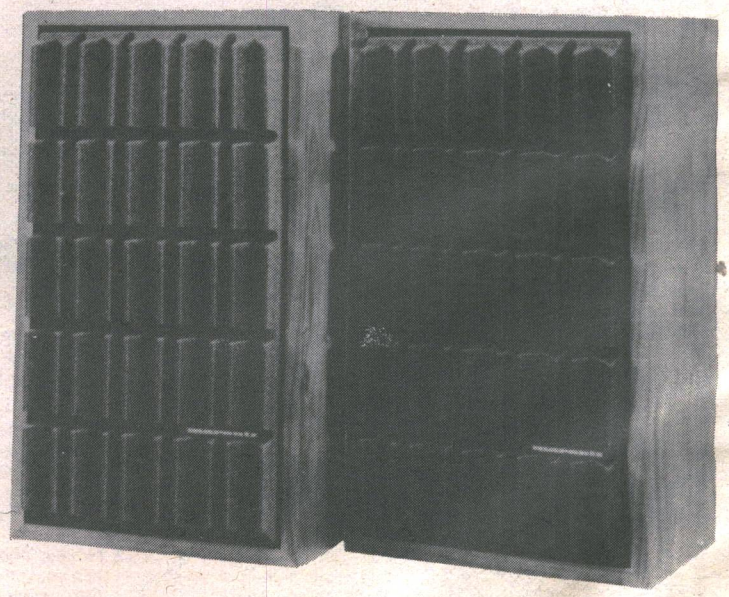
MODEL 140 STEREO POWER AMPLIFIER



MODEL 3200 STEREO PREAMPLIFIER CONTROL CONSOLE



MODEL 5420 STEREO CASSETTE DECK
with mixing console, Ferrite heads,
and Dolby Noise Reduction System



MODEL HD 55 THREE-WAY BOOKSHELF
SPEAKER SYSTEM
with 8" woofer, 4½" midrange, 1½" LPF dome tweeter

Hi-Fi explained.

Hi-Fi has to be the most misunderstood and abused term in the English Language.

Everybody knows and uses it, but virtually no two people's understanding of it is the same.

A recent piece of research showed that most people thought that anything more sophisticated than an electrified horn-gramophone was hi-fi.

And seven watts per channel was seen as big time—where it was understood at all.

What was the sample used for this all revealing piece of erudition? Two hundred and fifty people interviewed emerging from hi-fi stores in Tottenham Court Road. Where else!

So we thought we'd put the record straight. And try and go for some sort of definition.

What It Is. And What It Isn't.

Properly the term is High Fidelity. 'Fidelity' means faithfulness or accuracy. So High Fidelity means ultra-faithfulness—to the original.

Hi-Fi however is not another way of saying 'stereo'. In fact hi-fi needn't be stereo, and most stereo isn't hi-fi.

More Of What It Is.

The technical requirements of equipment that are to be considered hi-fi are being raised all the time.

What was acceptable just three or four years ago won't do today.

The absolute minimum level of performance is said to be expressed in the German Din 45/500 standard.

Which doesn't really make anyone much wiser.

Basically it's this.

The equipment used to put the signal onto a record is constructed with a view to ensuring that only that signal is recorded, free from distortion or any additional noise.

The equipment you use to replay that record also shouldn't distort or add to that original signal.

Which seems simple enough.

But unfortunately sound reproduction equipment that promises this doesn't come cheap.

What Does Hi-Fi Look Like?

This is probably the biggest elephant trap of all.

Very, very few manufacturers of electronics make high-fidelity equipment.

Not because they can't, but because they won't.

Years ago marketing men realised that more and more people were becoming enthusiastic about good music. They also realised that most people don't have a very perceptive 'ear'. So they started to build sound reproduction equipment that looked like the expensive best. The trouble was that those big fat boxes were virtually empty. And sounded it to all but the millions of people who were satisfied—with equipment that just looked the part.

Today nothing has changed.

So How Do You Tell

Good high fidelity stereo sound reproduction, doesn't come cheap.

In this world we get what we pay for.

And if equipment costs a lot to manufacture no manufacturer is going to give it away.

So the best way to make the right decision is to get the specialist Hi-Fi Journals and read up the reviews.

If you're going to spend several hundred pounds check very carefully what you're going to spend it on first.

There's Another Way.

Marantz have been making High Fidelity equipment for a great many years.

Not Mid-Fi or Low-Fi. But the real thing.

We do not however expect you to take our word for it. So if you would care to fill in and send to us the coupon below we in turn will mail you a selection of recent press criticisms of our equipment.

You are of course right. You will not receive any bad crits—but mainly because there aren't any.

But even so we want you to be totally sure.

So we're doing something that very few companies have ever had the courage to do before.

From October 1st to the end of December we're giving the complete Marantz electronics range an incredible 5 years, no-holds barred guarantee on parts and labour. Yes, five years!!

If that doesn't convince you nothing ever will.

marantz.

We sound better.

☐ Give me the official word on Marantz. Please send me everything.

☐ Don't send the crits, but send me brochures and price lists.

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QUAD-Quarter of a century of amplifier development



The Acoustical Manufacturing Co. Ltd. have been designing and producing amplifiers since 1936 but it was not until 1951 that the Q.U.A.D. 1 was introduced, the forerunner of the Quad series of Amplifiers which have earned an unrivalled reputation for originality of design, excellence of performance and reliability in the ensuing twenty-five years.

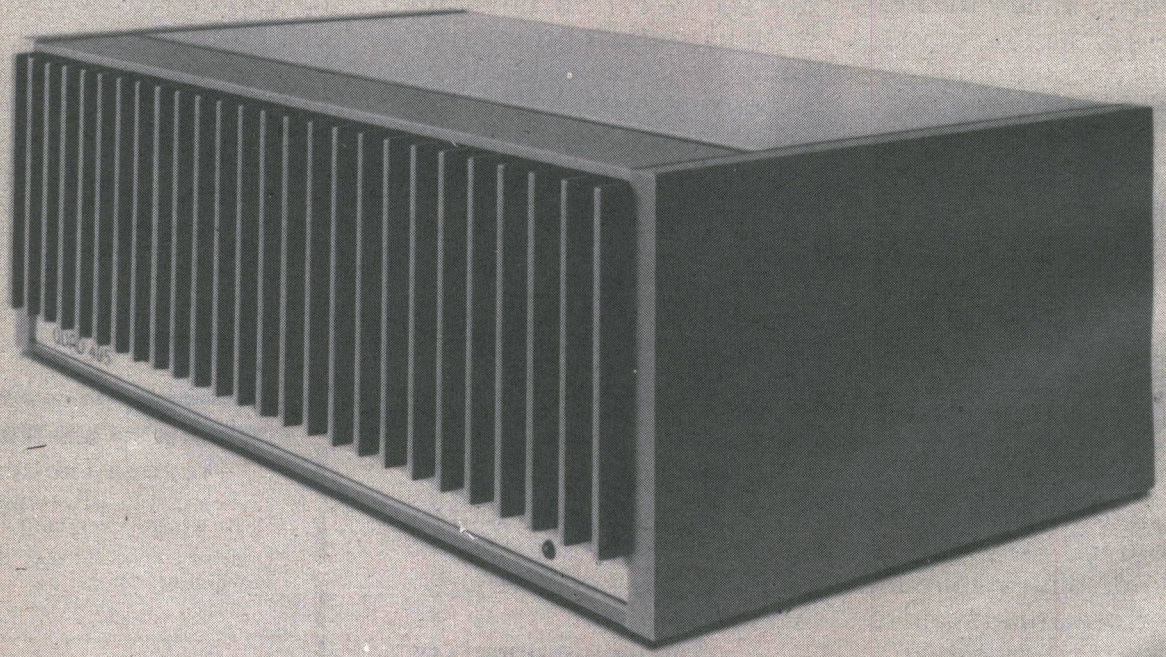
The introduction of the Quad 405 current dumping amplifier represents yet another contribution to the science of sound reproduction.

Current dumping successfully overcomes many of the problems associated with high power amplifiers, crossover, thermal tracking and matching of components, added to which the complete absence of adjustments or alignment requirements, ensures that performance will be consistently maintained.

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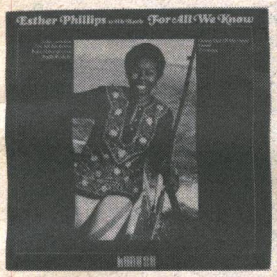
SOUL



Island ILPS 9369 £2.99

Third World

Third World are normally filed under reggae - they opened for the Wailers on their last tour here but one. But this is really a most unusual reggae record. While there's always the familiar pulse on the bass, there are also vibrant echoes of soul, African chants, Latin music. The songs are dramatically presented (if they have a fault, it's to over-indulge this), tempos change and the solos emerge at just the most telling points. At least three of the songs can still sound after very intensive listening like first choice when you want a song to listen to. At the time of writing you can buy the the record at Virgin shops for only 99p, but even at full price it's not to be missed. **RB**

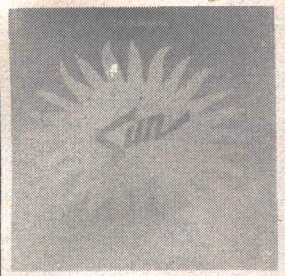


Kudu KU 28 £2.95

Esther Phillips with Beck

For All We Know

What A Difference A Day Made, from the previous Esther PhillipsJoe Beck LP, was something of a hit, and its successor seems to have an unfortunate lack of initiative, or dependence on a formula. Here we have more of the same lush disco versions of tired 'standards' - all processed through the Beck homogenization machine. While he may be a fine guitarist, as an arranger he seems singularly lacking in innovative capacity. The bored listener can, however, while away the time working his way through the list of 38 musicians and singers who participated in this LP, trying to remember where he has heard of them all before. A far more entertaining occupation than listening to the music. **RC**



Capitol E-ST 11461 £2.99

Sun

Live on, Dream On

The fact that Sun come from Dayton, Chio, and that three former members of the band went off to join the Ohio Players may give some idea of what to expect. Predictably, they sound not dissimilar to their celebrated co-Ohians, if that's the right word (probably not, Ed.) and might well be described as poor relations to the very successful Players. Technically proficient, they lack the crunching energy and attack of the best funk bands, and their lack of enthusiasm and excitement communicated itself to your reviewer. There are quite enough good-to-middling funk bands around already, and Sun have nothing to raise them out of the run-of-the-mill category. At least the Ohio Players have those sleeve pictures...(They were going to call their next LP 'Sludge' but they couldn't find a model). **RC**



Polydor Special 2482 278 £1.79

Joe Simon

Drowning In The Sea Of Love

It seems a lot more than four years since the sound of Philadelphia was something new and exciting, a genuine breath of fresh air in a generally stagnant soul music scene. Perhaps we have heard too much of the Philly sound since then, too many records too similar to one another, but this reissue of the classic Joe Simon LP makes a refreshing change from the stereotyped Phillydisco records of today. Those were the days when the nucleus of the Philly sound had already formed — producers Gamble and Huff, arrangers and writers like Thom Bell and Bunny Sigler, the session men later to be known as MFSB, now the Salsoul Orchestra — and before success had caused them to split up and dissipate their energies. I suppose that most of those who would be interested bought this LP in 1972, but those who didn't can now recapture that first, fine, careless rapture. **RC**

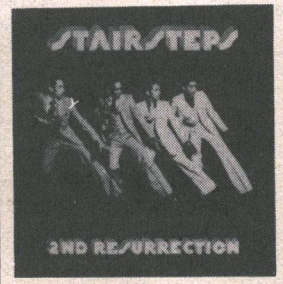


Epic EPC 81268

Isley Brothers

Harvest For The World?

Intriguing high energy set which owes a little Stevie Wonder and Sly Stone and much more to the extended disco work outs favoured by newer soul bands. The format may sound familiar but the interpretation is a classy cut above average. The *Prelude* to the title track is slightly pretentious but the number itself is accomplished enough to attract many who don't class themselves as soul fans. *Who Love You Better* is best offering from a band who've long passed their *Twist And Shout* days. **MS**



Dark Horse AMLH 22004

Stairsteps

2nd Resurrection

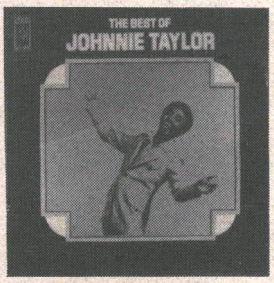
Softest sounding and most lilting sound heard in ages from a quartet who rely on none of those studio and session tricks which characterise so many seventies sounds. There's the reflective quality of Marvin Gaye and the near perfect production of gentle instrumental — *Theme of Angels* – which breathes feeling without falling over an excess of hi hat and strings (Billy Preston's in there as arranger). The set suggests gospel experience and the ability to let voices fly free of stereotyped arrangements and preconceived sounds. **MS**



Polydor Special 2482 339

Soul Factory

Twenty-eight tracks make this album fantastic value and stars like Johny Bristol, Gloria Gaynor, Joe Simon, Millie Jackson and James Brown make it a superb non-stop dance record with guaranteed performances. But — be warned — the tracks are cut and segued to give an average running time of 90 seconds each. It still adds up to 20 minutes plus a side but just when you're ready to put your foot or ear to catch the next familiar note of Joe Simon's *Step by Step* your suddenly into Gloria Gaynor's Honey Bee. The soul of any party. **MS**



Stax STX 1049

Best Of Johnnie Taylor

Johnnie offers some pretty meaty sentiments in this collection of soulful raps on the lines of *Somebody's Sleeping In My Bed* and Cheaper To Keep Her. Call it male chauvinist soul or hear it as a warning: Mr. Taylor's simply saying look after your lady or someone else will. There's muscle in the music too — the hefty chomp of stax at its best. Rock hard soul for the initiated. **MS**



Stax STX 1051

Margie Joseph

Makes A New Impression

Margies all together in slower, softer mood on this '72 album than some of her recent sides of AtlanticCotillion. A long, dramatically spaced rendition of the Supremes *Stop In The Name Of Love* really does transform a classic hit into a totally different song although it would have benefited by omitting the *Women Talk* monologue which precedes it. Punish Me leaves Clydie King's version unrivalled but Sweeter Tomorrow and *How Beautiful The Rain* reveal Margie at her unalloyed best. **MS**



Pye NSPL 28222

Sheer Elegance

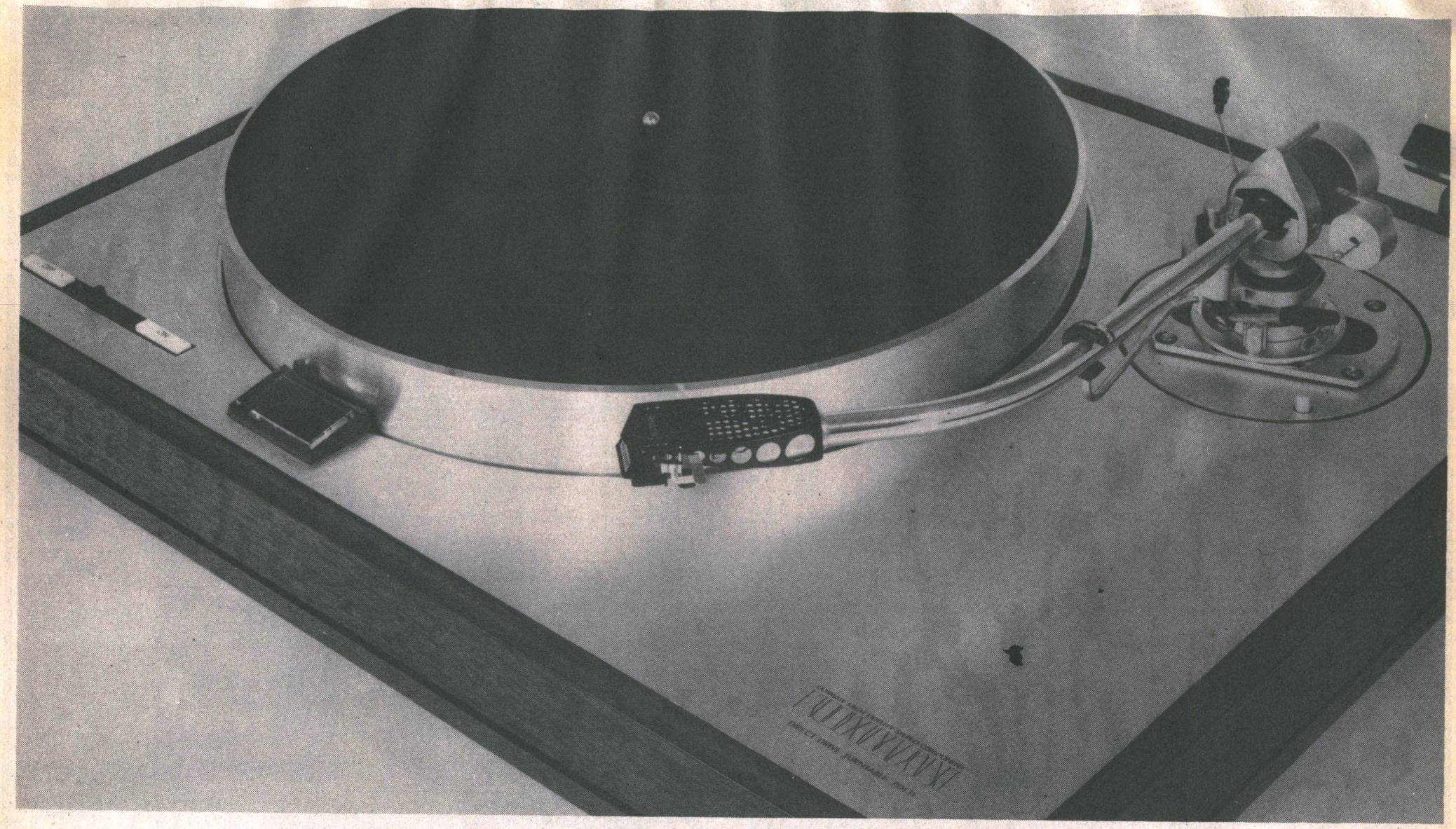
Simple, soul-tinged soft sounds make Sheer Elegance one of the most listenable bands in the sophistisoul stakes while their professionalism has already earned them a standing ovation on the recent Supremes tour. *Life Is Too Short Girl* and *Milky Way* have already made the group a single success and on this showing they're about to have a longer playing success as well. **MS**



Tamla Motown STML 12028

Motown Magic Disco Machine Vol. 11

Long, orchestral soul based — but heavily string assisted — tracks make this an album for comfortable toe-tapping or the most languid of dancing partners. Motown's hypnotic beat is replaced by the seemingly endless repetition of orchestral motifs whose 'glamour' suggests a middle of the road approach; William Goldstein was producer. Not to be confused with the same label's excellent Discotech albums. **MS**



3009+PD131

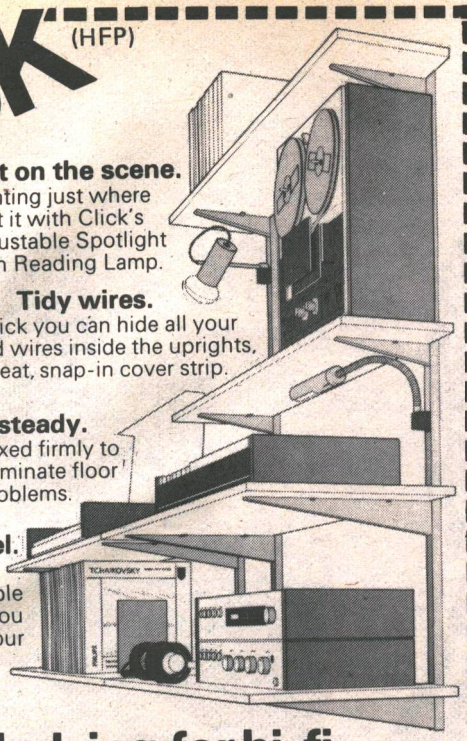
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GOOD NEWS FROM *Connoisseur*



THE NEW BD2/A

Based on the popular BD2, the new BD2/A offers the hi-fi enthusiast all the features usually associated with Connoisseur turntables, such as low rumble, wow and flutter, plus the addition of an automatic pick-up arm lift-off at the end of the record. This is achieved by an ingenious, though simple, electro-magnetic system, which avoids having any physical contact with the pick-up arm. It is possible, therefore, to use top quality cartridges, tracking at less than one gram, without putting any extra side pressure on the stylus.

The BD2/A comes either as a chassis model, or mounted on a slimline plinth, standing on rubber anti-vibration feet, finished in genuine American walnut, and fitted with a bronze, hinged dust cover. For those with restricted space, a compact plinth measuring only 13½" × 15½" × 5⅛" is still available.

Specification
Rumble - 65dB when measured in accordance with DIN 45539 using weighting network, referred to 7cm/sec. at 330Hz.
Wow and flutter Less than 0,1%.
Hum level - 80dB.

The BD2/A sells for a recommended price of only £55.00 + VAT. Ask your local hi-fi dealer, or write to the factory, for further details.

Connoisseur

Manufactured by:- **A. R. Sugden & Co (Engineers) Ltd.**, Atlas Mill Road, Brighouse, West Yorkshire, HD6 1ES.
Telephone: Brighouse (04847) 2142. Telegrams & Cables: Connoisseur, Brighouse.

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Instead, we invite you to do the work, since it's you who will ultimately benefit.

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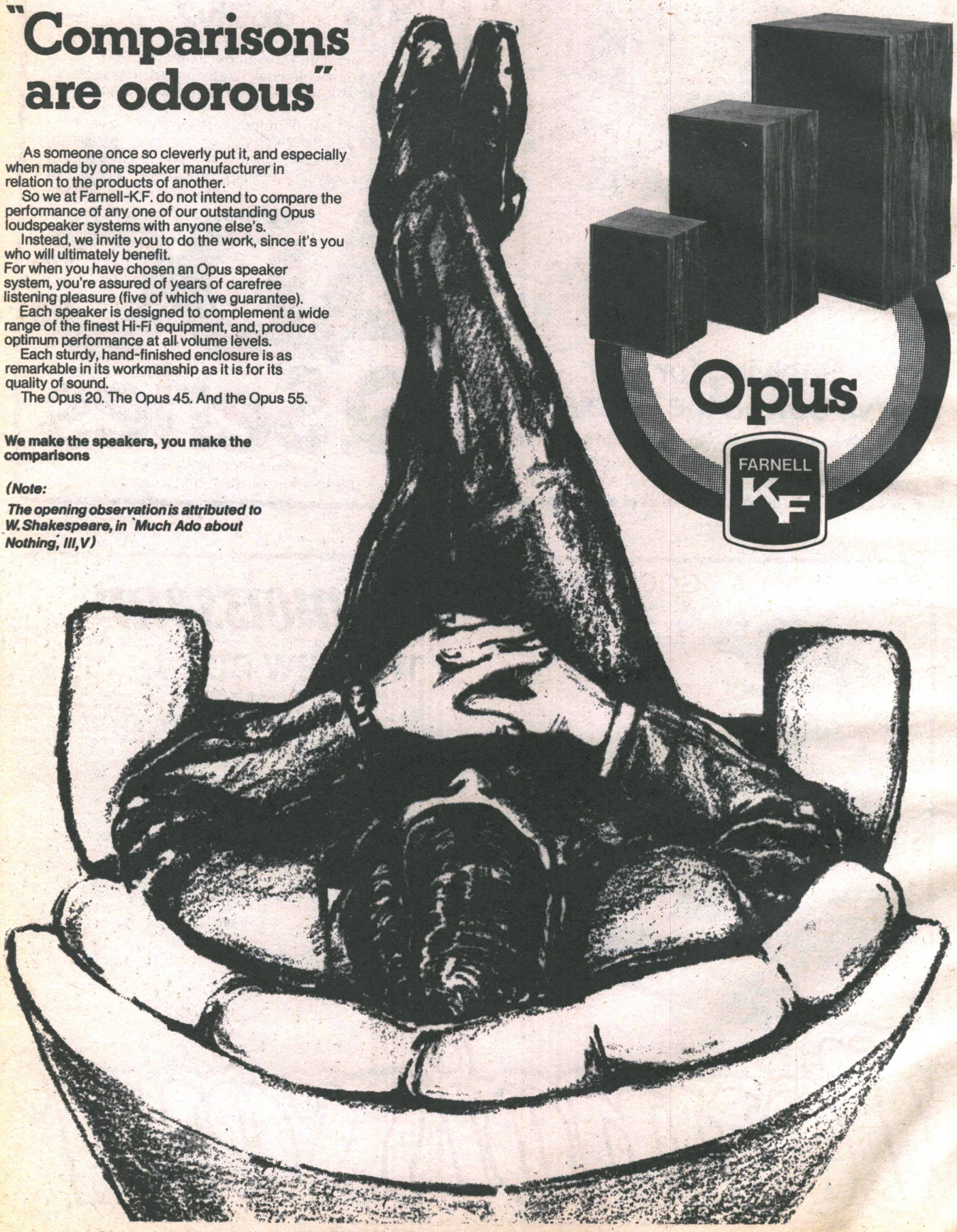
Each sturdy, hand-finished enclosure is as remarkable in its workmanship as it is for its quality of sound.

The Opus 20. The Opus 45. And the Opus 55.

We make the speakers, you make the comparisons

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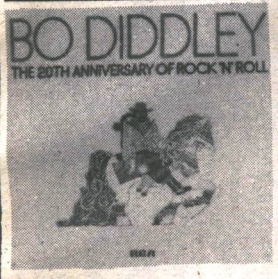
The opening observation is attributed to W. Shakespeare, in 'Much Ado about Nothing', III,V)



For further details please write to Farnell-K.F. Limited, Ashton Road, Bredbury, Stockport, Cheshire, England. Telephone: 061 494 1441

RECORDS TO BUY POPULAR

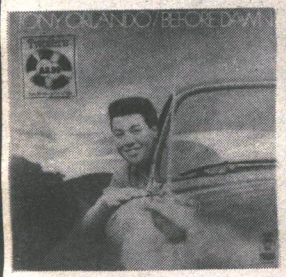
MALE



RCA RS 1042 £2.99

Bo Diddley
The 20th Anniversary of Rock 'n' Roll

It's a great year for anniversaries: America's 200th and, according to Mr Diddley, R'n'R's 20th. Yet despite the fact that Bo Diddley has all but disappeared from the scene since I started shaving, he certainly sounds less dated than many other living legends resuscitated for our amusement, and I'm not excluding the Neils Sedaka and Diamond. In fact he's in fine voice all round. Side B of this set is taken up with a surprising tight and exciting medley of Bo's old hits, including *I'm A Man* (twice), *Hey Bo Diddley* and the great *Who Do You Love*, powered along by the drumming of Keith Moon and Carmine Appice and Tim Bogert's grumbling, dynamic bass. But we all knew that he couldn't fail with remakes of old hits. What is even more impressive is the sheer strength of Side A, where, apart from *Not Fade Away*, he takes some faily undistinguished material and really makes it hum. The old guy's still bursting with talent — so let's hope this encourages him to make his presence felt again. **IES**



Epic EPC 2207 £2.99

Tony Orlando
Before Dawn

Well, you know what they say about the darkest hour. And if that sounds unsympathetic, it's worth remembering — as the sleeve notes freely admit — that Orlando's undoubted talents were very much in eclipse during a whole era of pop history. From the early Sixties, when *Halfway to Paradise* and a couple of other hits made his future look suitably rosy, to 1970 and *Candida*, the name Tony Orlando meant next to nothing. This low-priced double album includes 19 tracks from his first incarnation: good fun, on the whole, dominated by Gerry Goffin and Carole King compositions and haunted, stylistically, by the spectre of Bobby Darin. He was a bit uncertain and tentative as regards pitch and phrasing at that time. But for fans of his later superslick lightweight pop, this is a fascinating glimpse of the prelude to Dawn. **IES**



RCA RS 1034 £2.99

Aztec Two Step
Second Step

Two American chaps, Neal Shuman and Rex Fowler by name. They're probably fed up with people saying they sound a weensy bit like Simon and Garfunkel at times (not to mention looking a little like them), but in all honesty there isn't very much else to say about them without becoming morbid. They don't sing badly. They don't sing particularly well. Their songs fill in the idle few minutes without causing too much offence, But you won't come away from this album whistling the tunes. **TP**



Monument MNT 81245 £2.99

Lloyd Green
Steel Rides

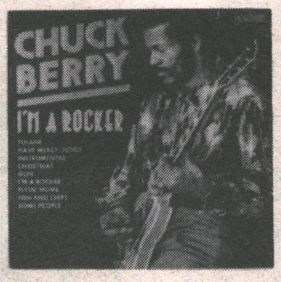
Mr. Green played steel guitar on McCartney's *Sally G*, and just in case you don't believe him, there's a photo of him with Mr. & Mrs. McC. on the sleeve. And just in case you still don't believe him, he kicks off this album with his own version of that very tune. Now, the pedal steel guitar makes one of the most beautiful and seductive sounds in rock music, and there's no denying that Lloyd Green knows what to do with one. But the law of diminishing returns comes into operation on an instrumental album like this, and the attraction of the sound does pall after a while. Very pleasant music, expertly played, but a wee bit samey after four or five tracks. **TP**



Atlantic K 50253

Billy Cobham
Life & Times

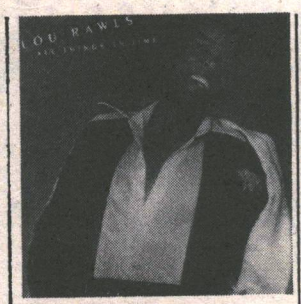
This is not the band heard on the recent Weather Report/Shakti tour. Nor is it entirely the pyrotechnically bland music heard from them then and on previous Cobham records. It's quite reflective. The instrumentation is, apart from occasional trimmings, no more than keyboards, guitar, bass and drums. The drumming is as impeccable as ever but here not particularly flashy. One song *(Song For A Friend)* is strongly reminiscent of *In A Silent Way*. But if it lacks some of the usual Cobham excesses there's nothing particular to recommend it either. **RB**



Contour CN 2019 £1.00

Chuck Berry
I'm A Rocker

Chuck circa '70 rocks gently on this 9-track set which appears to stem from his Mercury days. The racousness has quietened to a rock-based stroll but the music is still firmly rooted in R & B with familiar riffs appearing like long lost friends. Titles like *Christmas* and *Fish And Chips* may be unfamiliar but performances on *Tulane* and the title track are Chuck at his Berry best.



Philadelphia International PIR 81368

Lou Rawls
All Things In Time

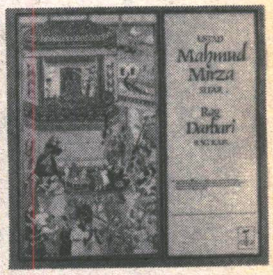
Blues cum soul veteran Lou Rawls seems an unusual signing to a label like Philadelphia but on this showing he's faired better than Brook Benton has in signing to All Platinum. This one really swings on *You're The One* (reminiscent of early Capitol sides); is slow and reflective on *Time:* but never falls into the production line soundalikes which have characterised many of Philly's albums. It *was* recorded at Sigma and it *does* feature TSOP — like you've never heard it before. **MS**



Dark Horse Records AMLH 22007 £2.99

Ravi Shankar's Music Festival From India

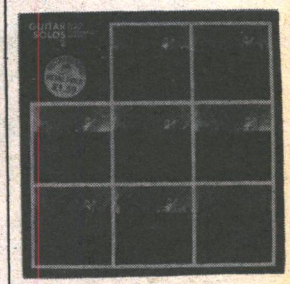
George Harrison produced and presumably financed, Ravi Shankar wrote and arranged the music, but neither play. It's not in fact the classical sitar music Ravi Shankar plays. No living fountains are struck, nothing very intense. It's folk music, miscellaneous Indian instruments and a lot of singing, the sort of thing Harrison drew on for his *Wonderwall* music. There are little surprises, bits of what might in another culture be the hooks in good singles. It has the same sort of attraction as listening to the Chieftains. Harrison's sponsorship of Indian music and beliefs sometimes comes across as obsessive and humourless. Here he's provided the opportunity and the production and stepped back. The result is delightful. **RB**



Tangent TGS 123

Mahmud Mirza
Rag Darbari

Not for lovers of The East. There are no ethnic effects or cute tunes. This is a single raga played on the sitar, joined in the final movement by a tabla player. Mahmud Mirza's approach (combined with the demands of the particular raga) is cool and patrician. The opening is slow and deliberate and the climax is poised, inevitable and perfectly executed, but has little dash. Had it been Mahmud Mirza that George Harrison met rather than the more powerful Ravi Shankar, things would have been different, one feels. If you aren't familiar with Indian music, this will appeal because of the strength of the music in it and in spite of, rather than because of, the exotic framework. **RB**



Caroline C 1518 £1.59

Guitar Solos 2

Half a side each for Fred Frith, Derek Bailey, G.F. Fitzgerald and Hans Reichel. All recorded live unaccompanied, but all, with the exception of the ascetic Bailey, considerably fleshed out by extra pickups and other recording studio trickiness. Frith and Reichel play high Gothic (grandoise Floyd-like resolutions), which is perhaps surprising in such gritty-looking surroundings. Fitzgerald sounds a little more deliberate; ideas develop rather than just happen. Bailey carves small intense fragments out of the resisting metallic sound at the top of his guitar's range. If this is avant garde it's also accessible because there's only one instrument to listen to; and it doesn't feel avant garde. It only costs £1.59, too. **RB**

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CBS 76522

French Operatic Arias

Frederica von Stade/ LPO/Pritchard

The Young Americal mezzo-soprano makes a first solo recital disc of ravishing quality, with orchestral accompaniments of obvious enthusiasm for the occasion. The cover photo suggests a smaller, less capable voice than we encounter: Miss von Stade has ample tonal range, with a central sweetness and innocence. Her breathing, ornamentation, and pitch are beyond reproach, and her French diction — in Berlioz, Massenet, Meyerbeer, Offenbach etc — is, for once, wholly acceptable. Voice to orchestra presence is about right. A distinctive release. **CB**



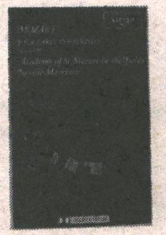
DH2740 150 (5 LPs)

Henze
Symphonies 1-6; Concertos

Soloists/LSO/Berlin Philh. Etc/Henze

Henze's DG recordings, regrettably, quickly disappear from the lists (although specialist dealers such as *Henry Stave* keep the German imports at higher prices). To mark the composer's fiftieth birthday, the five early symphonies (Berlin), and the recent sixth (LSO), are reissued with the Piano Concerto (Eschenbach/LPO), the Contrabassoon Concerto (Karr/ECO), and — conducted by Sacher — the Oboe/Harp/Strings Concerto (the Holligers). Where is the Violin Concerto, and *Ode to the West Wind*? That coupling remains unavailable. Incidentally, the review set had analytical notes only in German.

The music is divided between immediate post-war compositions, and scores which reflect Henze's political consciousness. The Piano Concerto is a large-scale complex materpiece, powerfully emotional: worth following with the Schotts score. The recordings are magnificent and pressing standards are impeccable. An important compendium. **CB**



Argo ZRC594

Mozart
Symphonies 13-16

St Martin's Academy

Technically an interesting cassette, since it approaches the disc quality so closely. Switching between a NEAL103 and Stanton/Grace/Linn (into Lecson) the differences were marginal: better bass definition on disc, more distortion on cassette. Running the two in synchronisation for a few minutes made it less easy to say which was the source heard — presumably because the imagination begins to supplant the sound as objectively received. The cover shows a continuo player, absent from these recordings. At the beginning of side 2 one bar seems to have been edited in twice. The Academy recorded these early works again, as part of a Philips package. **CB**



Philips 9500 043

Bartok
Piano Concertos 1, 3

Bishop-Kovacevich/LSO/Davis

By a wicked slip of colour printing, Colin Davis looks as though blacked up for *Othello*; the sleeve, done before the pianist began to manoeuvre his surname, advertises the now withdrawn Bartok 2. Nor is the HMV coupling of 1, 3 by Barenboim/Boulez still available for comparisons; the late Geza Anda's Bartok series comes as a DG double-pack. Bartok 3 has lost its former popularity, and listening to Bishop-Kovacevich's skilled and thoughtful interpretation (exquisite stillness in the *Adagio religioso*) I experienced a certain let-down: in part a reflection on the performance, which does not quite attain its goals. The LSO playing is not consistently good, and the first movement ends without being perfectly closed as an entity. The finale glitters in an exhausting rather than exhilarating way. Anda/Fricsay are surpassed only in recording terms. Philips offer the best quality yet in these scores. **CB**



DG 2709 059 (3 LPs)

Mozart
Cosi fan tutte

Janowitz/Fassbaender/Prey/ Schreier/Panerai etc/VPO/ Bohm

also

Philips 6707 025 (4 LPs)

Caballe/Baker/Cotrubas/ Gedda/Ganzarolli/Van Allen etc/ROH Covent Garden Orchestra/Davis

Karl Bohm's third *Cosi* was recorded live at the 1974 Salzburg Festival, on his eightieth birthday. The score was cut in Rennert's production, unlike the Colin Davis or Solti versions.

Paradoxically, the studio-made set is more involving than the DG, where stage pattering noises recur, and voice movements are bewildering; the home listener feels cut off from the visual theatre happenings, when he can sense the players reacting to each other and to their audience. On Philips the staging is tailored for stereo, and the 'acting' geared for repeated listening. Regrettably the Philips discs have a hard edge to male voices; the decidedly mellow DG sound is easier to accommodate. (The DG is better on speakers than headphones.) The two conducting styles are vary different; Bohm is almost idiosyncratic in the overture, where the Vienna Philharmonic are allowed 'gaps' between the wind figurations: the direction is both firm and leisured. Davis is more classical, relaxed. His female cast is superior, although I personnally did not feel that Janet Baker was right for Mozart's opera; Janowitz (DG) does not characterise warmly. The Bohm has some roughness, the engineering is not very subtle, the staging is distractingly noisy — yet finally Bohm inspires affection where Davis leaves a grey feeling. Both boxes are lavishly furnished with libretti; maddeningly the Philips sides are merely numbered 1/2. **CB**



Philips 6500 966

Mozart
'Haffner' Serenade; March in D

Uto Ughi/Dresden State Orchestra/de Waart

Another welcome issue in an outstanding Dresden Mozart series: de Waart's Haffner is stylish, lively and the violinist has plenty of personality — rather like Zukerman's K.250. Nice to have the apt fillup, and the only complaint concerns the close balance afforded to Ughi. The violin is slightly out of scale, and the overall level is high, only just avoiding stridency. The VEB tapes are bright and spacious. **CB**



CBS 7723

Verdi
Requiem Mass

Arroyo/Veasey/Domingo/ Raimondi/LSO & Chorus/ Bernstein

Stereo recut of Bernstein's much-publicised 1970 Albert Hall recording, done in four-channels by Shepard-Auger team. Original mix, and SQ imports, were technically disappointing, with coarse balances and shifts of perspectives, plus high hiss level. All of these remain, and I can't suggest replacing your earlier pressings, although the actual disc-cutting (Germany) is now cleaner. The principal change is that the tapes are now somewhat subdued.

Other *Requiems* (Karajan's) are better sung; Reiner one recommends at medium-price. But for all its flaws, and over-dramatisation, Bernstein's exerts a real hold, and has such conviction that I could not be without it. The set I would choose for a vivid experience of the work after Giulini's: that too has its technical troubles, in HMV's recut. **CB**



Philips 9500 071

Schubert

'Trout' Quintet

Beaux Arts Trio etc

also

CBS 61623

Serkin/Marlboro Strings

Here, at last, is a top recommendation for those wanting something to match the classic 1958 Curzon/Vienna *Trout* (Decca), but in the freshest sound. The augmented Beaux Arts group play with spontaneity added as an overlay to a scrupulously thought-out reading, each instrumentalist reacting to his colleagues' phrasing. The engineering is superb; strings have a bloom, and the stereo disposition is excellent in definition.

The CBS reissue is deeply compelling; the conception seems to be Rudolf Serkin's — a searching account which some will undoubtedly feel attempts too much. Serkin's dryly accented playing might suggest Brahms or Beethoven, and the way in which the slow movement halts and awkwardly resumes life is characteristic of the striving approach. Recording mainly clean; slight rough edges. **CB**

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DG 2530 646

Schubert
'Trout' Quintet; Quartettsatz in c

Emil Gilels/Amadeus Q

The music-making here brings disappointments. Gilels has worked with the Amadeus before, yet there seems an unhappy coexistence of styles, the piano playing firm, beautifully prepared, but rather too serious and lacking in sparkle for this work; the strings are cosy in manner, and intonation is often surprisingly inaccurate. I miss the sense of interplay so striking in the Beaux Arts version. The fillup one assumes is also new, although there is nothing about the sound to suggest that this is not the 1960 Amadeus taping. **CB**

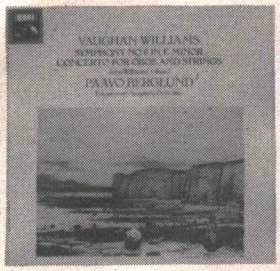


HMV SLS5046 £6.95

Beethoven Septet;
Schubert Octet; Clarinet Quintets by Mozart, Brahms, Weber (with Gervase de Peyer)

The Melos Ensemble

This four-LP basic set comprises remastered reissues of the most popular works in any chamber collection. But they happen to be in recordings that have found most critical favour over the years — the Vienna Octet the principal rivals, and in the Brahms there is a fine Philips alternative by Berlin Philharmonic players (don't confuse with the inferior *Universo* disc). At the price, with 25% discounts readily available, this album is the obvious buy for the beginner, the long-standing collector too might consider renewing his pressings since there are minor technical improvements in quality. **CB**



HMV ASD3127 (SQ)

Vaughan Williams
Symphony 6; Oboe Concerto

The Finnish conductor's manner is slightly austere; his performances have great integrity. The Bournemouth orchestra produces a fine, accurate, but stark sound quality. These distinctive features add up to a *sixth* that is a more than valid alternative to the NPO/Boult — also HMV — and the short concerto, dedicated to Goossens, is rarer than *Lark Ascending*. Even so I wouldn't recommend allowing the attractive 'Rondo Pastorale' to follow straight on from the eery Epilogue to the symphony (as it does on this record). The very open acoustic, with considerable depth of image, make for impressive waves of menave in the opening movement (incidentally, the *cor anglais* in the coda is an extraordinarily sensitive moment), and there are some superb percussion sounds from the back of the hall. **CB**



HMV ASD3132

Johann Strauss
Fledermaus overture; Annen-Polka; Blue Danube waltz; Gypsy Baron overture; Tritsch-Tratsch Polka; Emperor waltz

Berlin Philharmonic Orchestra/Karajan

One is as sensitive to orchestral timbres in Strauss as to enunciation in French song. I did not care for Karajan's previous Strauss with the Berlin orchestra — his VPO collection on SDD259 was a different story — and I am concerned over his new disc. The Berlin violins have a silky refinement that is without equal, but the basses, a characteristic foundation to the orchestral tonal architecture, give the wrong kind of density to this music. And Karajan's preoccupation with refinement of nuance has led to a slower pacing, and effects that almost fail to stand up. Karajan is, of course, a master of the idiom, but here I think he goes too far. The recording has that spacious quality one associates with the EMI team responsible. **CB**



CBS 77307 (3 LP) £7.99

Haydn
Symphonies 82-87

New York Philharmonic/Bernstein

Haydn with big gestures all round: including the price tag, which is high when comparitively little trouble seems to have been taken in cutting these transfers. At ends of sides at least, the SBRG originals were much cleaner. The acoustic is reverberant, balances are close, and there is some congestion. Still, a Supex cartridge makes these recordings tolerable, and — however shocking to purists — I recommend Bernstein's *Paris* symphonies in preference to Dorati's 'Marl-moreal' set. If heavy-handed in places, the readings are imaginative, warm-hearted, and in the fast movements zestful. I suspect that Bernstein actually used reduced strings, although the sound is inflated. **CB**



Heliodor 2548 238

Beethoven/Mozart
Piano Concerto 3. Concert Rondos K.382, 386

Annie Fischer/Bavarian State Orchestra/Fricsay

At £1.35 the Hiliodor series is worth browsing through, especially with the recent increases in prices. This spontaneous version of the C-minor concerto was issued in 1961; it reappears with the original couplings. Annie Fischer treats the solo part in a very individual way: with a less authoritative manner her performance would have seemed too free for more than a single hearing. In the Largo she manages to combine firmness with inwardness. Her Hungarian compatriot is a tactful conductor; in all the partnership yielded vital results. The piano tone remains good, the orchestral strings sound dated, mainly when muted in the Beethoven slow movement. **CB**



Decca KCET595

Mozart
Cosi fan tutte — excerpts

Lorengar/Berganza/Davies/Krause/Bacquier etc/LPO/Solti

One mught not think, initially, of Solti for *Cosi*. But this characteristically generous selection of highlights (no overture) may well tempt you to the complete set. Swift speeds in marked contrast to Bohm's, but the pacing is not unconvinving. Lorengar's 'Come scoglio' and the beautiful orchestral accompaniment to 'Soave sia il vente' are memorable inclusions. I found the continui playing intrusively 'bright', and did not care for Ryland Davies's sandy vocal timbres — but reactions to the voice are extremely personal. Decca have produced their very best tape quality: ideal for late night headphone listening, if the Kingsway underground rumbles don't disturb you! **CB**



CBS 76500

de Falla
Three-cornered Hat; Harpsichord Concerto

Igor Kipnis/NYPO/Boulez

Boulez's series of recordings with the New York orchestra have proved his happiest yet — his involvement with the French music-exploration project will be our loss — and this spacious and effective recording, produced by Andrew Kazdin, must be ranked with the outstandingly successful Ravel *Daphnis* ballet (76425). Jan de Gaetani makes brief vocal contributions, as presumably do the orchestral players in the *Oles* and handclaps. (The backdrop of castanets is an entertaining production touch.) Boulez may not efface memories of Bernstein's final *Jota* (his collection 'Espana' is overdue for reissue), but his flair and care for detail make us listen absorbed, not impatient for the 'big numbers'. The accompaniment in the Stravinsky-like concerto is provided by key members of the NYPO. Strongly recommended. **CB**



Decca SXL6725

Gottschalk
Piano music

Ivan Davis

The bicentenary year celebrations have brought an influx of American music into the record catalogues — notably from Decca, who taped the brilliant virtuoso pianist Ivan Davis at Kingsway Hall in Jan '75, in this recital of twelve pieces by the New Orleans composer Louis Gottschalk. The recording is in the traditions of Decca's very best pianoforte quality, giving just the right weight to the bravura writing. A caprice such as *Pasquinade* is not to be missed; and those who fell for Rifkin's Joplin series (*Nonesuch*) should be captivated by this. Davis gauges the moods of these pieces to perfection: serious in *Le bananier* until a sudden fistful of treble flutterings makes you laugh out loud. The racy *Tournament Galop* makes a Horowitz-ian encore. **CB**



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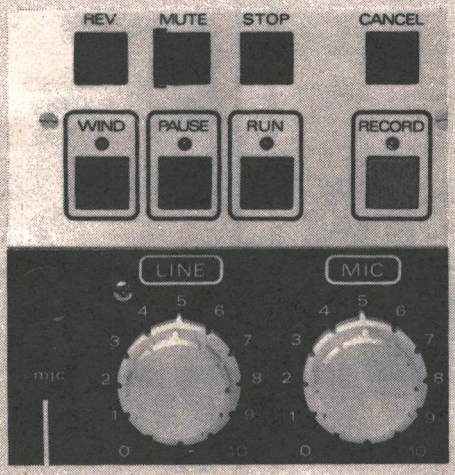
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If you're reading Hi-Fi Weekly, and other hi-fi publications, trying to decide on your first-ever hi-fi system, you may well be confused by the apparent contradictions between one "Consumer Report" and another "Lab-Test Report" by one of the magazines.

In addition, you find manufacturers' advertisments, all seeming to claim exceptional specifications for their products, and alongside these you read the lastest "Panel Report" who evidently found these units less then impressive.

If you have already ventured out into the hi-fi jungle of London's West End you may also be concerned by the frequency with which your questions on matters such as reliability, for instance, are now being met with blanket-statements by the staff to whom you have turned for advice. A common answer these days in "if it's British, it's unreliable" which doesn't quite fit with your friend's recommendations to buy a British amp like his as he has been delighted with it for years. We're not surprised if you're bewildered by it all.

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Specifications can be fun to compare, but they can be a nightmare to plough through if you're new to it all. And even those well-versed in the jargon used by the hi-fi media, and by many dealers too, will agree that none of the written words can convey how one component can differ so much when you listen to it and another "on-paper Twin".

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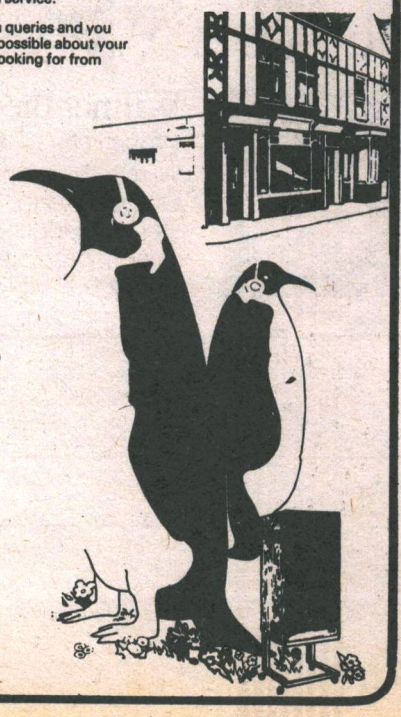
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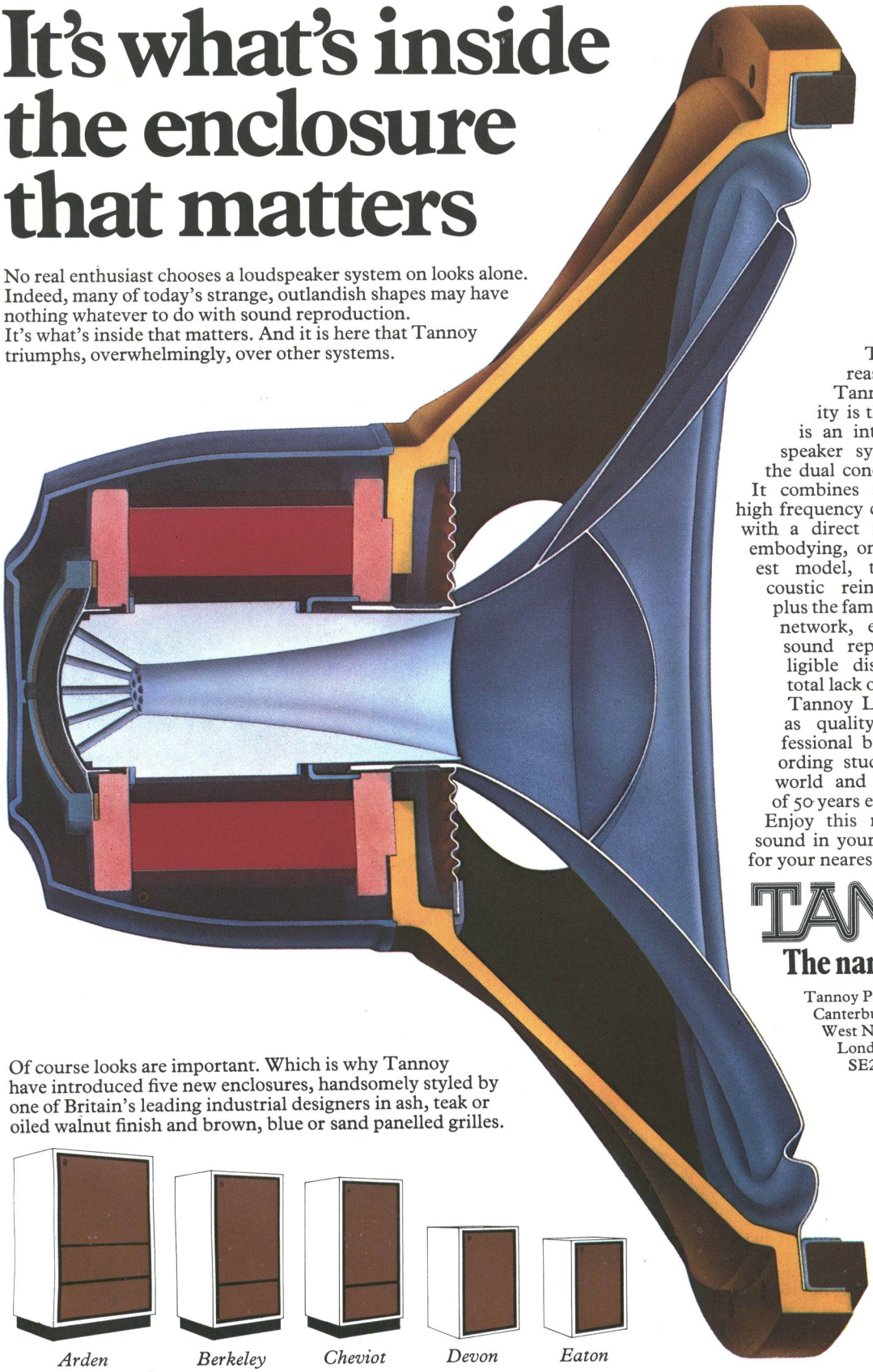
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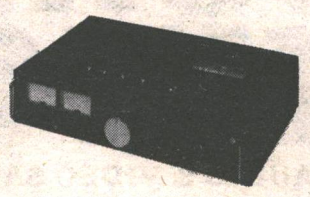
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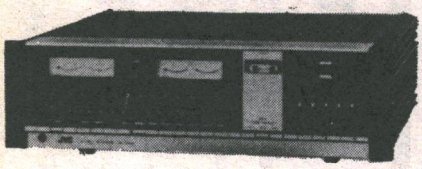
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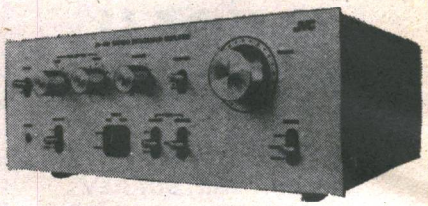
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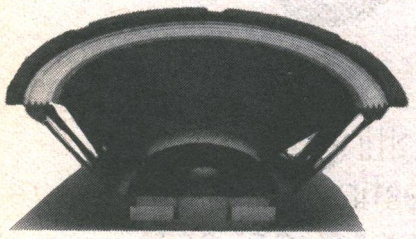
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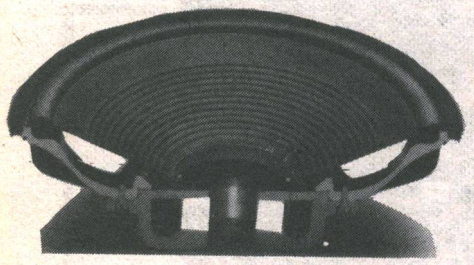
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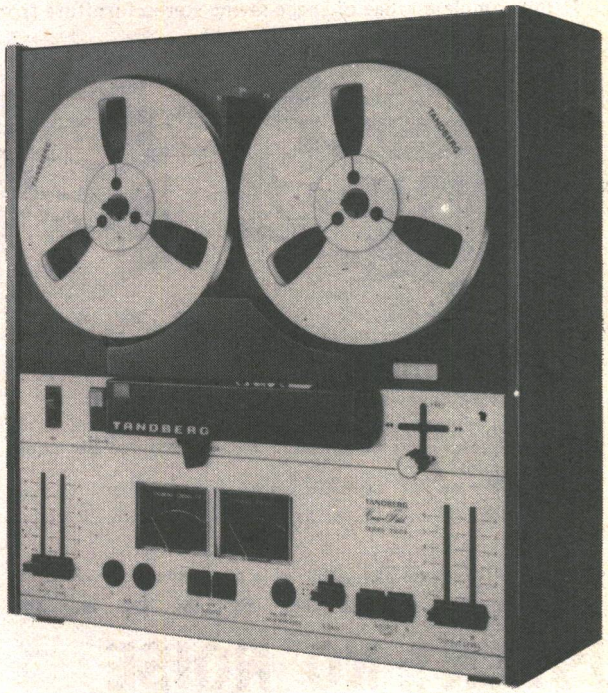
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NIGHTINGALE
AUDIO CONSULTANTS
15 FLAXMAN ROAD, SE5

Callers by appointment only

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THE firm for speakers!



Baker Group 25, 3, 8 or 15 ohm		£9.00
Baker Group 35, 3, 8 or 15 ohm		£10.75
Baker Deluxe, 8 or 15 ohm		£12.38
Baker Major, 3, 8 or 15 ohm		£10.69
Baker Regent, 8 or 15 ohm		£9.00
Baker Superb, 8 or 15 ohm		£16.31
Castle Super, RS/DD		£9.28
Celestion MI11000 horn, 8 or 15 ohm		£13.50
Decca London and Xover		£36.90
Decca DK30 and Xover		£24.70
EMI 8" roll surr. base		£5.73
EMI 5" mid range		£3.15
EMI 14" x 9" Bass 8 ohm		£11.92
EMI 8 x 5, 10 watt, d/c, roll/s 8 ohm		£3.56
Elac 59RM109 15 ohm, 59RM114 8 ohm		£3.38
Elac 10 in. 10RM239 8 ohm		£3.85
Elac 6½ in. d/cone, roll/s 8 ohm		£3.83
Fane Pop 15 watt 12 in.		£5.50
Fane Pop 33T		£9.75
Fane Pop 50 watt, 12 in.		£12.50
Fane Pop 55, 12 in. 60 watt		£15.50
Fane Pop 60 watt, 15 in.		£17.95
Fane Pop 100 watt, 18 in.		£27.95
Fane Crescendo 12, 8 or 15 ohm		£37.95
Fane Crescendo 15, 8 or 15 ohm		£49.95
Fane Crescendo 18, 8 or 15 ohm		£67.95
Fane 801T 8 in, d/c, roll/s, 8 ohm		£8.96
Goodmans 8P, 8 or 15 ohms		£6.20
Goodmans 10P, 8 or 15 ohm		£6.50
Goodmans 12P, 8 or 15 ohm		£14.95
Goodmans 12P-D, 8 or 15 ohm		£16.95
Goodmans 12P-G, 8 or 15 ohm		£16.50
Goodmans Audiom 200, 15 ohm		£13.46
Goodmans Axent 100, 8 ohm		£7.60
Goodmans Axiom 402, 8 or 15 ohm		£19.80
Goodmans Twinaxiom 8 in., 8 or 15 ohm		£9.50
Goodmans Twinaxiom 10in. 8 or 15 ohm		£9.86
Jordan Watts Module 4, 8 or 15 ohm		£15.36
Kef T27		£5.18
Kef T15		£6.25
Kef B110		£6.75
Kef B200		£7.85
Kef B139		£15.08
Kef DN8		£2.08
Kef DN12		£5.39
Kef DN13		£4.05
Coles 4001G		£5.90
Coles 4001G & K		£5.90
Baker Major Module	each	£13.28
Goodmans Mezzo Twinkit	pair	£46.50
Goodmans DIN 20. 4 ohm	each	£13.28
Helme XLK30	pair	£21.95
Helme XLK35	pair	£26.75
Helme XLK40	pair	£38.50
Kefkit 1	pair	£51.00
Kefkit 3	each	£46.00
Peerless Dome Tweeter DT10HFC		£8.26
Peerless Dome Tweeter KO10DT		£7.25
Radford BD25/8		£23.40
Radford MD9		£11.50
Radford TD3		£7.25
Radford Cross Over Network		£14.75
Richard Allan Twinkit	each	£13.46
Richard Allan Triple 8	each	£20.25
Richard Allan Triple	each	£25.16
Richard Allan Super Triple	each	£29.25
Richard Allan RA8 Kit	pair	£37.80
Richard Allan RA82 Kit	pair	£59.40
Tannoy 10 in.		£78.00
Tannoy 12 in.		£86.00
Tannoy 15 in.		£99.95
Wharfedale Linton 2, kit	pair	£21.50
Wharfedale Glendale 3 XP kit	pair	£47.70
Wharfedale Dovedale 3, kit	pair	£59.40
Wharfedale Denton 2XP Kit	pair	£43.35
Wharfedale Super 10 RS/DD		£13.50

Prices correct at 13.9.76

ALL PRICES INCLUDE VAT

Cabinets, wadding, vynair crossovers etc. Send stamp for free booklet "Choosing a Speaker" FREE with orders over £10 — "HiFi loudspeaker enclosures" book. All units guaranteed new and perfect. Prompt despatch. Carriage: Speakers 55p each; 12" and over 85p each; tweeters and crossovers 33p each; kits £1 each (pair £2).

WILMSLOW AUDIO
DEPT. HFP
SWAN WORKS, BANK SQUARE, WILMSLOW, CHESHIRE, SK9 1HF
Tel. Wilmslow 29599

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Access and Barclay Card orders accepted by phone

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— This exciting Music Console takes all your stereo units records & tapes

FREE COLOUR leaflet

- Modern white and teak- style finish to go with any decor.
- Heavily constructed with rubber mounted speaker plinths.
- Durable, easy clean melamine surfaces.
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- Height 21½ ins; Depth 15 ins; Length 48 ins, extending up to 82 ins.

Complete unit comprises:
- MAIN BASE UNIT — with record storage — book case — audio unit shelves.
- MATCHING SPEAKER PLINTHS and extension top with adjustable record/tape deck recess.

WHITE as illustrated £37·50 plus £2·30 carriage.
Teak-style also available.

UNITS FROM £8·95.
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Please send me your free colour brochure

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Address.....

.....

LEISURE TIME
Telephone (0752) 61668 Limited

5 YEAR GUARANTEE The TAPE SPECIALISTS

These prices normally only apply when 100 cassetts are purchased, but Hi-Fi For Pleasure MAIL ORDER customers may order any quantity they wish at these special 100 prices.

AGFA LN		**BASF CrO2**		**MEMOREX 8TR**		**TDK(D)**		**REELS**	
C.60	39p	C.60	£1.01	45 min	£1.16	C.45	44p	**AGFA Low Noise**	
C.90	54p	C.90	£1.26	60 min	£1.25	C.60	49p	5" LP	£1.48
C.120	81p	C.120	£1.63	90 min	£1.35	C.90	70p	5¾" LP	£1.80
AGFA(SFD)		**HCL SUPER**		**PHILIPS**		C.120	94p	7" LP	£2.39
C.66	56p	C.90	80p	C.60	45p	C.180	£2.20	10½" Cine	£6.50
C.96	73p			C.90	61½p	**TDK(SD)**		**NAB**	£6.70
C.120	£1.05	**MAXELL LN**		C.120	81p	C.45	*49p	5" DP	£1.96
AGFA CrO2		C.60	56p	**SCOTCH New Dyn**		C.60	*58p	5¾" DP	£2.60
C.60	69p	C.90	72p	C.60	53p	C.90	*85p	7" DP	£2.95
C.90	91p	C.120	91p	C.90	67p	C.120	£1.23	**AGFA PEM (Matt Back)**	
C.120	£1.29	**MAXELL UD**		C.120	92p	**TDK(AUDUA)**		5" LP	£2.10
AMPEX 20/20+		C.46	88p	**SCOTCH H/E**		C.45	78p	7" LP	£3.35
C.90	£1.10	C.60	£1.01	C.45	60p	C.60	91p	10½" NAB	£8.35
AUDIO GRAMM		C.90	£1.15	C.60	65p	C.90	£1.30	5" DP	£2.45
C.60	34p	C.120	£1.56	C.90	85p	**TDK(SA)**		7" DP	£4.10
C.90	45p	**MAXELL UD/XL**		**SCOTCH CrO2**		C.60	93p	10½" DPNAB	£9.50
C.120	55p	C.60	£1.15	C.45	68p	C.90	£1.30	**AMPEX High Frequency**	
AUDIO GRAMM CrO2		C.90	£1.44	C.60	83p	**FUJI FX Cassettes and FUJI FG tape please phone for prices.**		7" LP	£1.90
C.60	64p	**MEMOREX MrX2**		C.90	£1.05			7" DP	£2.55
C.90	85p	C.30	58p	**SCOTCH CLASSIC Fe Cr.**				**AMPEX 20/20+ (Matt Back)**	
BASF LH		C.45	63p	C.90	£1.55			7" LP	£2.94
C.60	51p	C.60	67p	**SCOTCH VIDEO**				10½" LP	£8.52
C.90	68p	C.90	*72½p	VC60	£16.25			**MEMOREX**	
C.120	93p	C.120	£1.25	**SONY LN**				5" LP	£1.58
BASF SUPER		**MEMOREX CrO2**		**SONY HF**				7" LP	£2.63
C.60	76p	C.45	83p	**SONY CR and SONY Fe Cr.**				10½" LP	£7.13
C.90	£1.01	C.60	89p	**Please phone for our latest lowest prices on these great tapes.**				5" DP	£2.10
C.120	£1.30	C.90	*£1.05					7" DP	£3.45
								TDK AUDUA	
								7" LP	£2.65

*EXTRA SPECIAL OFFER

All offers subject to availability ADVERT CLOSES: 30/11/76

Prices correct at 2.10.76 and include VAT but are subject to change without notice. Cash with order. P & P: 1p every cassette; 10p every tape. Minimum P & P 65p.

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All mail to:
Dept PLF, 1a HIGHBURY STN, HIGHBURY CORNER, LONDON, N5.
(01-607 0644) Callers welcome.

(3rd Floor) 244 EDGWARE RD, W2.
113 RECTORY GROVE, LEIGH-ON-SEA. (S'end 712861)

E.P.S.

120 at Shops near you!

C.90 MEMOREX MRX2 OFFER!

SAVE 20%

eg. 2 for £1.82
10 for £8.80
WHILST PROMOTION PACKS LAST



Agfa Compact Cassettes

	Low Noise List	Low Noise One	High Output Ten
C.60	1.00	54p	5.18
C.90	1.39	76p	7.25
C.120	2.09	1.12	10.80

STAR OFFERS

ADD'N'STAC – Interlocking storage system. Holds 8 cassettes. OUR PRICE 54p EACH

CASSETTE HEAD CLEANER 50p

DOZENS OF OTHER BLANK TAPES AND VIDEO CASSETTES AVAILABLE AT SHORT NOTICE. JUST ASK!

Executive CASSETTE CASE
Simulated leather brief case. Holds 30 cassettes.
Worth £4.00 OUR PRICE ONLY £2.35!

SPECIALLY RECOMMENDED AUDIOGRAMM

	Low Noise One	Low Noise Ten	CrO_2 One	CrO_2 Ten
C.60	36p	3.50	67p	6.45
C.90	46p	4.50	89p	8.50
C.120	59p	5.70	-	-

MEMOREX
Reproduction so true it can shatter glass

MRX2 Type	List	One	Ten	CrO_2 List	One	Ten
C.45	1.27	80p	7.65	1.68	1.05	10.10
C.60	1.34	84p	8.00	1.79	1.12	10.75
C.90	1.77	1.14	11.00	2.55	1.59	15.30
C.120	2.44	1.56	15.00	-	-	-

C.90 SELECTION

	List	One	Ten		List	One	Ten		List	One	Ten
AGFA SFD (SM)	1.54	1.06	9.65	MAXELL UD XL	2.95	1.85	17.75	SCOTCH CrO_2	2.15	1.46	14.00
AGFA CrO_2 (SM)	2.30	1.26	12.10	SONY LN	-	96p	9.20	TDK Dynamic	1.62	98p	9.40
FUJI FX	1.86	1.35	13.00	SONY CR	-	1.87	18.00	TDK SD	1.79	1.23	11.85
MAXELL UD	2.36	1.50	14.25	SCOTCH H/E	1.78	1.19	11.40	MEMOREX 8TR	2.74	1.71	16.45

BLANK CASSETTES TAPES ACCESSORIES

5 YEAR GUARANTEE CASSETTES

ALL OFFERS SUBJECT TO AVAILABILITY. PLEASE PHONE FIRST.

All mail orders to: Dept A/PLF P.O. Box 193. London. N7 8JY P. & P. 30p

These prices correct 1.9.76. but subject to change. ALL PRICES INCLUDE V.A.T

GREATER LONDON

BARKING – Photomarkets, 89 East Street, (594 3626)
BATTERSEA – Estovision, 132 Battersea Pk. Rd. (622 2700)
BROCKLEY – Stomleys, 177 Lewisham Way. S.E.4 (692 2823)
BROMLEY – J. Payne, 25 Station App., Hayes (462 1293)
CROYDON – Just Tapes, East Croydon Station (681 3062)
FINCHLEY Typewriters, 134 Ballards Lane (346 7195)
FOREST HILL – Telectric, 76 Brockley Rise (690 3104)
FULHAM – Harry Hayes, 847 Fulham Rd. (736 4597)
GREENWICH – Hane's, 127 Greenwich Sth. St. (692 3590)
GUILDFORD – Guildford Hi Fi, 270 High St. (71534)
HANWELL – Seba Elec., 104 Uxbridge Road, W.7 (579 5644)
HOLBORN – 56 Theobalds Rd., W.C.1 (405 1535)
HORNCHURCH – Wavemill, 26 Roneo Corner (48182)
ILFORD – Molsons, 347 High Rd. (478 1247)
ISLEWORTH – Altronic, 548 London Rd. (560 5755)
LOUGHTON – Paul Parry, 152 & 281 High Rd. (508 4838)
MANSION HOUSE Typewriters, 44 Cannon St. (248 1809)
MARBLE ARCH Typewriters, 8 Edgware Rd. (402 8457)
MILL HILL – H. Norman-Davis, 91 The Broadway (959 2049)
MOORGATE Typewriters, 157 Moorgate, E.C.2 (628 4532)
PONDERS END – Pounds, 266 High St. (804 3000)
PURLEY – Bonaparte Records, 3 Purley Rd. (688 8627)
REGENT STREET Typewriters, 275 Regent St. (629 3627)
RICHMOND – Brandwares, 4 Station App., Kew (940 3758)
SOUTHFIELDS – Estovision, 387 Durnsford Rd. (946 0632)
SOUTH HARROW – M. & J. Parkes, 4 Station Pde., Northolt Rd (422 3548)
STREATHAM – Jackson's, 88 Streatham Hill, S.W.2 (674 6607)
THORNTON HEATH – Tracks, 48 Brigstock Rd. (684 4700)
VICTORIA – Recordsville, 86 Wilton Rd. (828 4825)
W. DRAYTON – Rainbow Records, 15 High St., Yiewsley (46478)
W. KENSINGTON – H. Hayes, 203 North End Rd. (385 1481)

AROUND BRITAIN

ACOMB (YORK) – R. S. Cuckston, 67 Front St. (York 791502)
AMERSHAM – Radio House, 84 Sycamore Rd. (3311)
BASINGSTOKE – Hughes, 3 Winklebury Centre (28328)
BATH – Fishlock, 63a West Avenue, Oldfield Pk. (27718)
BEACONSFIELD – T. R. Photographics, 9 London End (71263)
BEXHILL-ON-SEA – Dray's, 21 Western Road (212652)
BIGGLESWADE – H. & H. Domestic, 87 High St. (312960)
BIRMINGHAM 6 – Mousleys, 309 Witton Rd. (327 0582)
BIRMINGHAM 11 – Wattis T.V., 169 Anderton Rd. (772 5429)
● BIRMINGHAM 17 – Wattis T.V., 277 High St. Harborne (427 3547)
BIRMINGHAM 20 – Top Ten, 594 Bristol Rd. (472 2463)
BIRMINGHAM 28 – Stringer, 1328 Stratford Rd. (777 2646)
BLACKPOOL – Chammings, 107 Central Drive (28380)
BLACKPOOL – Stewarts Radio, 2 Caunce St. (21163)
BLAYDON – Music Box, 34 The Precinct (425 2612)
BOGNOR REGIS – S. E. Smith, 47 Aldwick Rd. (23188)
BOURNEMOUTH – Blacklocks, The Square (21003)
BRIDLINGTON – Bridlington Photo., 8 Bridge St. (5048)
BRIGHTON – D. C. Gunn, 108 Western Rd. (734227)
BRISTOL 3 – T.V. Centre, 135 West St. Bedminster (665691)
BRISTOL 6 – Criddles, 3 Eotse Rd. (36691)
BRISTOL 8 – Revolver Records, The Triangle (299105)
BURNLEY – Record Exchange, 42 Standish St. (35594)
CAMBORNE – Western Service, 70 Trelowarren St. (712055)
CARDIFF – Words & Music, 49 Wellfield Rd, Roath Pk (371472)
CHESHAM – Record House, 9 Market Square (74549)
CLACTON – Moody's, 130 Old Road (22931)
COLCHESTER – R. B. Bacon, 174 Butt Rd. (73295)
CONWAY – Paul A. Roberts, 12 Castle St. (2453)
COVENTRY – K. W. Leigh, 245 Walsgrave Rd. (458252)
CRAWLEY – Loughran's, 4 Ealing Pl., Broadfield (35000)
DARWEN – Shree's, 287 Blackburn Rd. (71440)
DAVENTRY – Spackman & McKenzie, 58 High St. (2617)
EASTBOURNE – Howarth's, 8 Albert Pde., Green St. (21806)
FAILSWORTH – A. J. McKechnie, 1 Ashton Rd. East (061 682 7005)
FORMBY – Quirk Electrical, 6 Ryeground Lane (72396)
FORMBY – Quirk Records, 32 Chapel Lane (74048)
FROME – Lankester Haynes, 10 Catherine Hill (3221)
GILLINGHAM – Smith's 320 Canterbury St. (Med. 51852)
HARLOW – Paul Parry, 2 Westgate, The High (26155)
HARTLEPOOL – Pattison's, 81 York Rd. (72690)
HEMEL HEMPSTEAD – Old Town Records, 63 High Street (55186)
HEREFORD – Buzz Music, 65 Widemarsh St. (55961)
HERTFORD – Back-Tracks, 14 Railway St. (59294)
HOVE – D. F. Browne, 418 Portland Road (Brighton 417120)
IPSWICH – Groove, 35 Buttermarket (53181)
LANCASTER – Ear-Ere Records, 14 Market Ent. (61400)
LEICESTER – D. Earl, 40 Hinckley Rd. (548002)
LINCOLN – Lincoln Hi Fi, 271a High St. (20265)
LIVERPOOL 7 – Blacks, 99/101 Wavertree Rd. (263 1112)
LOWESTOFT – Coastline Elec, 168 London Rd. Sth. (64837)
MAIDSTONE – Baldocks, 8 St. Faith's St. (54658)
MANCHESTER – "One Stop Records", 13 Gateway House, Piccadilly Stn. App. (236 8314)
NELSON – G. Wilkinson, 55 Netherfield Rd. (62901)
NEWCASTLE-UPON-TYNE – Music Box, 34 The Precinct, Blaydon
NORTHAMPTON – Spin-a-Disc, 19 Abington Sq. (31144)
NORTHAMPTON – Richard Reeves, 174 Kettering Rd. (33578)
NORWICH – Collins, 25 The Walk, (25548)
NOTTINGHAM – Eddy's, 116 Alfreton Rd. (74015)
OXFORD – Belsyre, 59 Woodstock Rd. (55226)
POOLE – Kenneth Sims, 10 Station Rd., Parkstone (746071)
PRESTON – George Seymour, 266 New Hall Lane, (794249)
READING – Gerald Hughes, 14 Cross Street (51975)
REDRUTH – John Oliver, 33 Fore St. (Redruth 6494)
RUGBY – H. Whaley, 7 Sheep St. (2808)
SALISBURY – Higgins & Son, 47 Market Place (27645)
SCARBOROUGH – Derwent, 5 Columbus Ravine (65996)
SCUNTHORPE – McCoy's Radio, 19 Dunstall St. (67998)
SLOUGH – Arian Electronics, 60 High St. (31877)
SOUTHAMPTON – Squibb Electronics, 52 Bedford Place (23787)
SOUTHPORT – Audio Corner, 117 Portland St. (37332)
S. SHIELDS – Northern T.V. 230 Stanhope Rd. (4271)
ST. LEONARDS-ON-SEA – D. S. Douglas, 113 Sedlescombe Rd. North (Hastings 428065)
STOCKTON – Lamb & Fowler, 7 High St., Norton (553970)
SWANSEA – Aquarius, Killay Shopping Centre (28787)
SWINDON – Peter Gilbert Cameras, 31 Havelock St. (5396)
WAKEFIELD – Richards, 12 Marygate, Westgate (73115)
WELLINGBOROUGH – Visual Sounds, 47 Midland Rd. (223061)
WESTGATE – Coastal Elec., 5 Station Rd. (Thanet 32253)
W. MALLING – Baldocks, 39/41 High St. (842331)
WESTON S' MARE – G. Stanton T.V. 67 Orchard St. (23872)
WEYMOUTH – Dorset Radio, 29 Walpole St. (5729)
WHITLEY BAY – D.J.'s Records, 143 Park View (34155)
WILMSLOW – Hi Fi Centre, Green Lane (24766)
YORK – R. S. Cuckston, 412 Huntington Rd. (23415)
YORK – York Photo Audio Centre, 51 Fossgate (56176)
● Indicates new Branch

M37

HI-FI PRICES

A guide to current Hi-Fi equipment recommended retail prices. All exclude VAT.

Headphones

Key: S = stereo, M = mono, Q = quadraphonic, Ω = matching impedance

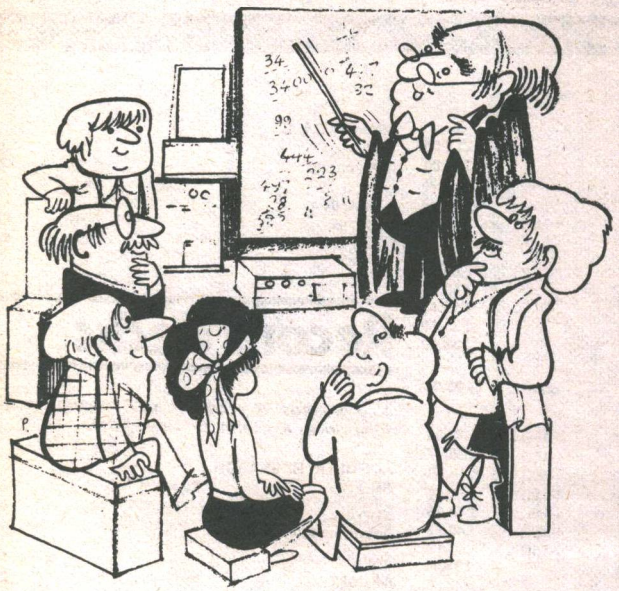
AKG			
K100	S	600Ω	£10.80
K140	S	600Ω	£18.00
K150	S	600Ω	£16.00
K160	S	600Ω	£24.00
K240	S	600Ω	£29.00
CONDOR			
KS-208	S.	8-16Ω	£2.80
MS-422	Q.	8Ω	£13.50
MS-425	Q.	8Ω	£12.00
MS-426	Q.	8Ω	£10.50
S-444	S.	8-16Ω	£7.25
HP1/C	S.	8-16Ω	£11.00
DYNATRON			
SP3	S		£19.60
SP4	S		£15.60
EAGLE			
FF6	S.	8-16Ω	£14.00
FF29	Q.	8-16Ω	£18.00
G3000	S.	8-16Ω	£12.20
G6000	S.	8-16Ω	£9.80
H2008	S.	4-16Ω	£12.90
H2009	S.	4-16Ω	£15.60
SE5	S	8-16Ω	£3.95
SE10	S	8-16Ω	p.o.a.
SE30	S/M	8-16Ω	£8.60
SE40	S.	8-16Ω	£6.80
SE60	S.	8-16Ω	£11.40
SE70	S.	8-16Ω	£10.90
SE75	S.	8-16Ω	£11.60
ESS			
Phase 1	S	32Ω	£75.00
GOLDRING			
K105	S		£13.80
K110	S		£18.00
HITACHI			
HD50	S	8Ω	p.o.a.
HD60	S	8Ω	p.o.a.
HD404	S	8Ω	p.o.a.
HOWLAND-WEST			
CIS200	S	8Ω	£5.90
CIS250	S	8Ω	£10.20
CIS300	S	8Ω	£13.50
CIS600	S	8Ω	£12.50
CIS800	S	8Ω	£9.60
CIS800V	S	8Ω	£10.60
CIS900	S	8Ω	£11.60
CIS1100	S	4-150Ω	£19.50
CIS4000	S/Q		£18.50
CIS7000	S	8Ω	£17.20
JVC			
HP150	S	150Ω	£17.50
HP20	S	8Ω	£16.00
HP1000	S	1000Ω	£25.00
5944	S/Q	8Ω	£24.50
KOSS			
K/7	S.		£10.00
Technician/VFR	S.		£40.00
Phase/2+2	S/Q		£85.00
Easy Listener	M/S		£25.90
K711	S	3-600Ω	£12.50
K6	S		£13.95
K6LC	S		£15.95
KO-727B	S		£18.00
KO-747	M/S	300Ω	£23.00
PRO-4AA	S		£31.50
PRO-5LC	S		£34.50
Phase 2	S		£42.00
HV1A	S		£26.50
HV1LC	S		£29.95
ESP6A	S		£59.00
ESP9	S		£100.00
K6LC/Q	S/Q		£29.00
KO-747Q	S/Q		£42.00
PRO5Q	S/Q		£45.00
K2+2	S/Q		£49.00
HV-2	S	3·2-600Ω	
MARANTZ			
SE1	S		£62.00
SD-5	S		£18.00
MICRO			
MX-1	S	4-16Ω	£48.00
NAD			
05	S		£9.17
10	S		£12.87
16	S		£18.43
RP18	S		£35.89
20E	S		£38.80
PHILIPS			
N6302	S	600Ω	£21.99
PIONEER			
SE-205	S.	4-16Ω	£12.53
SE-300	S.	4-16Ω	£20.77
SE-305	S.	4-16Ω	£19.58
SE-500	S.	4-16Ω	£29.12
SE-505	S.	4-16Ω	£40.65
SE-700	S.	4-16Ω	£48.58
SE-Q404	S/Q	4-16Ω	£30.13
Monitor 10	S		£38.15
ROSS			
RE-220	S.	8Ω	£4.00
RE-225	S.	8Ω	£5.30
RE-230	M/S.	8Ω	£7.50
RE-236	S.	8Ω	£8.80
RE-237	S.	8Ω	£11.30
RE-240	S.	8Ω	£9.30
RE-245	M/S	8Ω	£10.90
RE-250	S.	8Ω	£10.90
RE-252	S.	8Ω	£15.00
RE-255	S.	8Ω	£15.40
RE-260	S.	4-32Ω	£16.50
RE-264	S/Q.	8Ω	£10.50
RE-270	S.	4-32Ω	£28.50
ROTEL			
RH-430	S	4-16Ω	£6.25
RH-630	S	4-16Ω	£9.95
RH-700	S	8-16Ω	£14.72
SANSUI			
SS10	S.	8Ω	£20.90
SS20	S.	8Ω	£27.90
SS50	S.	8Ω	£40.49
SH5	S.	25Ω	£20.56
SH15	S.	4-32Ω	£25.04
SENNHEISER			
HD4004	M	17Ω	£8.35
HD44	S	640Ω	£12.00
HD414	S	2000Ω	£18.80
HD424	S	2000Ω	£27.00
HD414-9	S	2000Ω	£30.80
HD110	S	200Ω	£40.20
SONAB			
H10	S.	400Ω	£22.20
H20	S.	400Ω	£27.87
SONY			
DR9	S	8Ω	£10.88
DR15	S	4-16Ω	£14.77
DR35	S	25Ω	£18.62
DR45	S	25Ω	£22.17
ECR500	S	30Ω	£57.56
STAX			
SR-5	S	130,000Ω	£76.00
SR-X3 Mk111	S	130,000Ω	£135.00
STEEPLETONE			
SE-23	S	8Ω	£3.91
SE-18B	S	8Ω	£10.18
SUPEREX			
CL-1	S.	35Ω	£30.00
PEP-79E	S.	4-16Ω	£47.60
PEP-81	S.	4-16Ω	£87.60
PRO-VII	S.	80Ω	£37.60
ST-N	S.	8Ω	£11.00
TL-3	S.	70Ω	£21.60
TECHNICS			
EAH-80E	S.	4-16Ω	£31.96
TOSHIBA			
HR-40	S/Q	4-16Ω	£30.00
HR-50	S	4-16Ω	£16.40
HR-80	S	4-50Ω	£80.00
TRIO			
KH32	S.	4-16Ω	£13.44
KH52	S.	4-16Ω	£18.24
WHARFEDALE			
DD1	s.	8-16Ω	£16.76
Isodynamic	S.	8-40Ω	£24.89
YAMAHA			
HP1	S	150Ω	£26.40
HP2	S	150Ω	£21.60

Record decks

Key: Speeds; B = belt drive, D = direct drive, I = idler drive, A = arm, C = cartridge.

ACOUSTIC RESEARCH			
AR-XB1	2sp	B A C	£64.00
ADC			
Accutrac 4000	2sp	D. A. C.	£255.20
AIWA			
AP 2060	2sp	B A	£70.30
AKAI			
AP003	2sp	B A C	£125.78
ALBA			
UA210	3sp	A C	£38.80
AMSTRAD			
TP12D	2sp	B A	£51.42
ARISTON			
RDII	2sp.	B. A.	£129.24
RDIIEL	2sp.	B. A.	£145.74
BANG & OLUFSEN			
1203	2sp	B A C	£71.92
2000	2sp	B A C	£92.72
3400	2sp	B A C	£111.60
4002	2sp	B A C	£238.80
6000	2sp	B A C	£311.60
BIC			
960	2sp.	B. A. C.	£94.50
980	2sp.	B. A. C.	£114.50
BSR			
BDS80	2sp.	B. A. C.	£50.96
BDS90	2sp.	B. A. C.	£56.14
BDS95	2sp	B. A. C.	£57.96
MP60	3sp.	A. C.	£39.43
CONNOISSEUR			
BD1	2sp.	B. (chassis only)	£18.20
BD2	2sp.	B. A.	£48.50
BD3	3sp.	B. A.	£85.00
DANSK			
1702	2sp	B A C	£115.57
DENON			
DP-3500	2sp	D	£162.30
DP-3700F	2sp	D A	£200.55
DUAL			
1229	2sp.	B. A. C.	£138.59
CS601	2sp.	B. A. C.	£124.30
CS701	2sp.	D. A. C.	£192.00
CS 1225/1	2sp	I. A. C.	£76.31
EAGLE			
D2005	2sp.	B. A.	£51.90
D2006	2sp.	B. A.	£88.00
EMPIRE			
598111	2sp.	B. A.	£199.00
69811	2sp	B. A.	£289.00
ERA			
Mk6X	2sp	B	£65.00
444	2sp	B A	£69.95
FONS			
CQ30	3sp	B	£92.50
FREELANCE PLASTIC			
FP2001	2sp	D	£70.00

A technical talk-in at Chew & Osborne



For the discerning hi-fi enthusiast and music lover we provide at Chew and Osborne the expert opinion and facilities to explore the full potential of the latest and most sophisticated equipment.

It is high time that we explained in greater detail our benefits for the hi-fi enthusiast and the discerning music lover. Within our showrooms we offer one of the finest ranges of quality equipment to be found anywhere and we are proud of our list of agencies which include names in the forefront of hi-fi development.

Take speakers for example. Whether you have a space problem or can accommodate the largest models, we offer a range from mini monitors right up to the largest reference standard units to suit your own individual requirements. These can be heard to perfection and critically assessed in the unbiased acoustic of our comparator rooms. We let you make up your own mind, but you can be assured of the best advice and opinion on any hi-fi topic.

In addition to speakers we stock the best in turntables, cartridges, amplifiers and tuners and take pride in our critical awareness of the latest hi-fi developments. With this service you may get the impression that our prices are considerably higher than most, but you will be surprised to learn that we can be as competitive as many so called 'Discount Houses'. **If you can't get to see us, we will be pleased to quote a price on the phone (make it a transfer call if you like).**

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HI-FI PRICES

A guide to current Hi-Fi equipment recommended retail prices. All exclude VAT.

GALE			
GT2101	D A		£750.00
GARRARD			
Zero 100SB	2sp.	B. A. C.	£82.75
86SB	2sp.	B. A. C.	£63.50
125SB	2sp	B A C	£55.95
63SP	3sp.	I. A. C.	£38.75
SP25 MkIV	3sp.	I. A. C.	£42.50
401 (chassis only)	3sp.	I.	£69.00
GOLDRING			
GL72	4sp.	I. A.	£48.00
GL75	4sp.	I. A.	£59.40
GL78	4sp.	I. A.	£79.50
GL85	2sp.	B. A.	£105.00
G102	2sp.	B. A.	£42.00
L65	2sp.	B. A.	£84.00
HITACHI			
PS10	2sp	B A	p.o.a.
PS14	2sp	B A C	p.o.a.
PS38	2sp	D A C	p.o.a
HARMAN-KARDON			
Rabco ST-7	2sp	B A	£320.88
JVC			
JL-A1	2sp.	B. A. C.	£62.13
LEAK			
3001	2sp	B A	£116.52
LINN-SONDEK			
LP12	1sp	B A	£156.00
LUX			
PD 131	2sp	D	£220.00
MARANTZ			
6300	2sp	D A	£196.50
6320	2sp	D	£154.86
6200	2sp	B A	£155.75
6100	2sp	B A	£94.53
PICKERING			
FA2	2sp.	B. A. C.	£138.00
FA4	2sp.	B. A. C.	£154.00
PHILIPS			
GA209	2sp	B A C	£132.00
GA212	2sp	B A C	£85.60
GA227	2sp	B A C	£44.80
GA418	2sp	B A C	£68.00
GA427	2sp	B A C	£52.00
PIONEER			
PL-530	2sp	D A	£208.90
PL-510A	2sp	D A	£141.96
PL-117D	2sp	B A	£118.66
PL-115D	2sp	B A	£80.02
PL-112D	2sp	B A	£71.79
REGA			
Planet	2sp	B A	£75.26
Planar	2sp	B A	£77.27
ROTEL			
RP-900	2sp	B A	£71.02
RP-1500	2sp	B	£66.22
RP-1500	2sp	B A	£81.33
RP-3000	2sp	D	£110.67
RP-3000	2sp	D A	£133.24
SANSUI			
SR-222P	2sp	B. A.	£73.30
SR525P	2sp	D A	£145.81
SANYO			
TP625	2sp.	B. A. C.	£59.95
TP700SA	2sp.	B. A. C.	£74.75
SONAB			
65S	2sp.	B. A. C.	£74.03
67S	2sp	B A C	£74.03
85S	2sp.	B. A. C.	£74.03
SONY			
PS1350	2sp	B A C	£69.29
PS2350	2sp	B A C	£75.51
PS4750	2sp	D A	£122.62
PS6750	2sp	D A	£151.06
STRATHEARN			
STM4	2sp	D A C	£79.95
STA4	2sp	D A C	£89.59
SMA2	2sp	D A	£149.38
TECHNICS			
SL-1300	2sp.	D. A.	£168.84
SL-120	2sp.	D.	£124.40
SL-110	2sp.	D.	£173.29
SL-20	2sp.	B. A.	£53.29
SL23	2sp	B A	£71.07
SL1500	2sp	D A	£106.62
SL-400	2sp	D A	£133.29
THORENS			
TD126C	2sp	A	£250.00
TD166C	2sp	B A	£95.00
TD160C	2sp	B A	£109.00
TD125AB MK2	3sp	B A	£165.00
TD145C	2sp	B A	£129.00
TOSHIBA			
SR-220	2sp	B. A.	£60.00
SR-255	2sp	D. A.	£101.77
SR-300	2sp	B A C	£63.60
SR-355	2sp	D. A.	£113.33
SR-370	2sp	D.	£128.89
SR-510	2sp	D A C	£200.00
SR-870	2sp	B A C	£113.20
TRIO			
KD-500	2sp	D.	£155.55
KD2033	2sp	B. A.	£86.00
KD5033	2sp.	D. A.	£145.78
YAMAHA			
YP800	2sp.	D. A.	£222.00
YP701	2sp	B A	£88.00
YP450	2sp	B A	£79.91
YP400	2sp	B A C	£70.40

Cassette recorders

AIWA			
AD1300	S D	30-14000Hz(F), 30-16000Hz(CrO_2)	£144.36
AD1600	S D	30-12,500Hz(F), 30-16000Hz(CrO_2)	£196.59
AD6300	S D	30-14000Hz (F), 30-16000Hz (CrO_2)	£141.77
AD6500	S D	30-14000Hz(F), 30-19000Hz(CrO_2)	£204.34
AD1800	S D, DNL	30-14000Hz(F), 30-17000Hz(CrO_2)	£233.66
AKAI			
CS34D	S D	40-13000Hz±3dB(F), 40-15000Hz±3dB(CrO_2)	£123.33
GXC39D	S D	30-14000Hz±3dB(F), 30-16000Hz±3dB(CrO_2)	£173.33
GXC310D	S D	30-14000Hz±3dB(F), 30-16000Hz±3dB(CrO_2)	£214.67
GXC710D	S D	30-14000Hz±3dB(F), 30-16000Hz±3dB(CrO_2)	£230.67
GXC75D	S D	30-14000Hz±3dB(F), 30-16000Hz±3dB(CrO_2)	£250.67
GXC325D	S D	30-15000Hz±3dB(F), 30-16000Hz±3dB(CrO_2)	£276.44
GXC740D	S D	30-15000Hz±3dB(F), 30-16000Hz±3dB(CrO_2)	£332.44
GXC760D	S D	30-15000Hz±3dB(F), 30-16000Hz±3dB(CrO_2)	£408.00
AMSTRAD			
6000	S	40-11000Hz (F), 40-14000Hz (CrO_2)	£64.04
BASF			
8200	S. D, DNL	20-12500Hz (F), 20-14000Hz (CrO_2)	£180.00
BANG & OLUFSEN			
1100	S D	40-12,500Hz	£110.00
2200	S D	30-14,500Hz	£159.60
5000	S D	30-15,000Hz	£238.80
BELTEK			
M1150	S. D.	30-15000Hz (F), 30-18000Hz (CrO_2)	£158.00
DANSK			
1802	S D	30-14000Hz(F), 30-15000Hz(CrO_2)	£133.33
DUAL			
901	S. D.	30-14000Hz (F), 30-16000Hz (CrO_2)	£228.50
GOODMANS			
SCD100	S D	40-15000Hz±3dB(F), 40-15000Hz±2½dB(CrO_2)	£156.56
HARMAN-KARDON			
HK2000	S D	40-15,000Hz ±3dB (F), 30-17000Hz ±3dB (CrO_2)	£222.22
HITACHI			
D2150	DNL	40-1600Hz(CrO_2) 40-1600Hz(CrO_2)	p.o.a.
D2310		40-14000Hz(F) 40-14000Hz(CrO_2)	p.o.a.
D2330	D	40-12000Hz(F) 40-14000Hz(CrO_2)	p.o.a.
D2360	D	40-14000Hz(F) 40-16000Hz(CrO_2)	p.o.a.
D2750	S D DNL	30-14000Hz(F) 20-16000Hz(CrO_2)	p.o.a.
D3500	S D DNL	20-15000Hz(F) 20-2000Hz(CrO_2)	p.o.a
ITT			
Stereo 88	S D	40-12000Hz(F), 40-14Hz($Cr0_2$)	£153.64
JVC			
CD-1740	S D	30-13000Hz(F), 30-15000Hz($Cr0_2$)	£79.80
CD-1656	S ANRS	30-14000Hz(F), 30-16000Hz($Cr0_2$)	£99.50
CD-1667	S ANRS	30-16000Hz(F), 30-18000Hz($Cr0_2$)	£111.00
CD-1950	S ANRS	20-17000Hz(F), 20-18000Hz($Cr0_2$)	£154.00
CD-1669	S ANRS	30-17000Hz(F), 30-19000Hz($Cr0_2$)	£272.00
CD-1970	S ANRS	20-17000Hz±3dB(F) 20-18000Hz±3dB(CrO_2)	£197.77
NAKAMICHI			
Dual-Tracer 550	S D	40-17000Hz±3dB(F), 40-17000Hz±2dB($Cr0_2$)	£301.03
Tri-Tracer 700	S D	35-18000Hz±4dB(F), 35-20000Hz±4dB($Cr0_2$)	£531.91
Tri-Tracer 1000	S D, DNL	35-18000Hz±3dB(F), 35-20000Hz±3dB($Cr0_2$)	£753.91
NEAL			
102	S. D.	35-12000Hz (F), 35-15000Hz (CrO_2)	p.o.a.
103	S. D.	35-12000Hz (F), 35-15000Hz (CrO_2)	p.o.a.
PHILIPS			
N2520	S	40-12000Hz(F), 25-14000Hz($Cr0_2$)	£171.30
PIONEER			
CT-F9191	S. D.	25-16000Hz (F), 20-17000Hz (CrO_2)	£332.56
CT-F2121	S. D.	30-13000Hz (F), 30-16000Hz (CrO_2)	£161.41
CT-5151	S. D.	30-13000Hz (F), 30-16000Hz (CrO_2)	£137.08
CT-4141A	S. D.	30-12,500Hz (F), 30-15000Hz (CrO_2)	£120.73
ROTEL			
RD-20	S D	30-15000Hz-3dB(F), 22-16000Hz-3dB($Cr0_2$)	£177.65
SANSUI			
SC636	S. D.	30-13000Hz (F), 30-16000Hz (CrO_2)	£142.06
SC737	S. D.	30-1300Hz (F), 30-16000Hz (CrO_2)	£164.38
SC2000	S D	35-1100Hz ±3dB (F), 35-12000Hz ±3dB ($Cr0_2$)	£180.19
SC3000	S D	30-13000Hz(F), 30-16000Hz($Cr0_2$)	£202.09
SANYO			
RD4055G	S. D.	50-8000Hz ±3dB (F), 50-12000Hz ±3dB (CrO_2)	p.o.a.
RD4250G	S. D.	50-8000Hz ±3dB (F), 50-12000Hz ±3dB (CrO_2)	p.o.a.
RD4600G	S. D.	40-10000Hz (F), 40-13000Hz (CrO_2)	£229.95
SONAB			
C500	S. D.	40-12,500Hz (F), 40-15000Hz (CrO_2)	£175.88
SONY			
TC117	S	40- 6000Hz(F), 40-13000Hz($Cr0_2$)	£69.29

The AR 14
Unrivalled performance in a two way speaker system



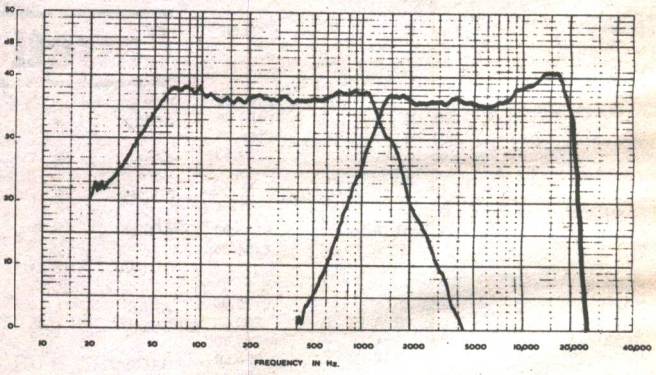
In the AR-14, significant cost savings have resulted from designing a system with two drivers rather than three. These savings have been accomplished with only a minimal sacrifice in accuracy. The energy response of the AR-14 in fact rivals that of the more expensive AR speaker systems.

The difficulty in designing an accurate two-way speaker system is that each of the units must be used over a broad frequency range. A woofer must be reasonably large or it will not reproduce the lowest tones properly. However, when a large speaker is used to reproduce midrange and high frequency sounds as well, it tends to become very directional. A listener sitting slightly to the side of the speaker will miss some of the higher frequencies.

The AR-14 is housed in the identical cabinet used for the AR-11 and 12 including the same acoustically transparent foam grill. A switch is provided to adjust the contour of the treble energy to suit various room environments.



AR engineers have eliminated most potential difficulties in the design of the AR-14 by using the 250 mm (10 inch) woofer only up to 1300 Hz. This, of course, makes the design of the highrange extremely critical, because it is required to cover the range from 1300 Hz up to the highest audible frequencies. A new 25mm (1 inch) dome tweeter solves the problem. It is small enough to provide smooth, well-dispersed sound at the highest frequencies, yet its one inch voice coil is fully able to handle the power requirements down to 1300 Hz. AR developed and introduced the dome radiator driver in 1959. If the coil is wound around the outer diameter of the speaker, all the advantages of a small, light speaker for accurate reproduction of the high notes and good dispersion are retained.



AR-14 ON AXIS RESPONSE OF SEPARATE DRIVERS THROUGH CROSSOVER

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☐ Please send the 'AR Guide to loudspeakers'. (Available at a cost of 20p.).

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HI-FI PRICES

A guide to current Hi-Fi equipment recommended retail prices. All exclude VAT.

TC138SD	S D	30-13000Hz(F), 30-15000Hz(CrO_2)	£177.73
TC153SD	S D	40-11000Hz(F), 40-12,500Hz(FeCr)	£159.95
TC177SD	S D	30-15000Hz(F), 30-18000Hz(FeCr)	£355.51
TC135SD	S D	40-10000Hz(F), 40-12000Hz(CrO_2)	£106.62
TC136SD	S D	40-11000Hz(F), 40-14000Hz(FeCr)	£128.84
TC186SD	S D	40-12000Hz(F) 40-15000Hz(CrO_2)	£119.95
TC204SD	S D	40-12000Hz(F), 40-15000Hz(FeCr)	£142.17
TC206SD	S D	30-12000Hz(F) 30-15000Hz(CrO_2)	£159.95
TC209SD	S D	30-13000Hz(F), 30-16000Hz(FeCr)	£222.17
TANDBERG			
TCD-310	S. D.	40-12,500Hz (F), 40-13000Hz (CrO_2)	£186.66
TCD330	S D	35-17000Hz±3dB(CrO_2)	£354.66
TEAC			
A-170	S D.	30-13000Hz (F), 30-16000Hz (CrO_2)	£143.00
A-400	S. D.	30-13000Hz (F), 30-16000Hz (CrO_2)	£173.00
A-420	S D	30-13000Hz (F), 30-16000Hz (CrO_2)	£215.00
A-440	S D	30-13000Hz (F), 30-16000Hz (CrO_2)	£237.00
A-460	S D	30-13000Hz (F), 30-16000Hz (CrO_2)	£275.00
A-650	S D	30-13000Hz (F), 30-16000Hz (CrO_2)	£329.00
TECHNICS			
RS-263US	S. D.	30-13000Hz (F), 30-15000Hz (CrO_2)	£97.73
RS-273US	S. D.	20-15000Hz (F), 20-16000Hz (CrO_2)	£135.96
RS-610US	S. D.	20-14000Hz (F), 20-16000Hz (CrO_2).	£106.62
RS-671US	S. D.	20-16000Hz (F), 20-18000Hz (CrO_2)	£177.73
RS-676US	S. D.	30-13000Hz ±3dB (F), 30-14000Hz ±3dB (CrO_2)	£223.96
TOSHIBA			
PC-6030	S D	20-15000Hz(F), 20-17500Hz(CrO_2)	£319.60
TRIO			
KX620	S. D.	40-11000Hz ±3dB (F), 40-12000Hz ±3dB (CrO_2)	£136.89
UHER			
CG-360	S. D.	20-12,500Hz (F), 20-15000Hz (CrO_2)	£560.40
WHARFDALE			
XP	S D	50-10000Hz±3dB(F) **50-12500Hz**±(CrO_2)	£146.66
WOLLENSAK			
4766	S. D.	35-14000Hz (F), 35-15000Hz (Classic)	£230.56
YAMAHA			
TC800GL	S. D.	30-13000Hz (F), 30-15000Hz (CrO_2)	£197.60

Cartridges

Key: S = stereo; Q = quadraphonic; Sp = spherical; E = elliptical; Sh = shibata; 4D = 4 dimensional; Qu = quadrapoint; Quh = quadrahedral.

ACOS			
104	S	E	£3.85
M6	S	Sp	£5.30
M6E	S	E	£11.84
M6EX	S	E	£15.06
ADC			
K8	S	Sp	£7.86
K8E	S	E	£9.08
K7E	S	E	£10.18
K6E	S	E	£10.97
K5E	S	E	£11.81
K3E	S	E	£12.35
P30	S	Sp	£6.91
P32	S	E	£9.09
P36	S	E	£10.97
Q30	S	Sp	£9.29
Q32	S	E	£12.68
Q36	S	E	£16.40
VLM MkII	S	E	£27.91
XLM MkII	S	E	£34.38
Super XLM MkII	Q	Sh	£48.62
AUDIO TECHNICA			
AT10	S	Sp	£4.68
AT11	S	Sp	£4.81
AT11E	S	E	£7.61
AT12E	S	E	£10.48
AT12S	Q	Sh	£20.78
AT13Ea	S	E	£16.61
AT14Sa	Q	Sh	£25.98
AT15Sa	Q	Sh	£37.20
AT20SLa	Q	Sh	£41.57
EAGLE			
FF12E	S	E	£14.00
LC05	S	Sp	£5.60
LC07	S	Sp	£6.80
ELAC			
STS-155-17	S	Sp	£10.00
STS-255-17	S	Sp	£15.00
STS-355-17	S	Sp	£18.00
STS-355-E	S	E	£24.00
STS-455-12	S	Sp	£24.00
STS-455-E	S	E	£29.00
STS-555-E	S	E	£39.00
STS-555-12	S	Sp	£34.00
STS-655-D4	S/Q	Sh	£49.00
EMPIRE			
2000	SQ	Sp	£9.90
2000E	S/Q	E	£10.90
2000E/1	S/Q	E	£15.50
2000E/11	S/Q	E	£18.00
2000E/111	S/Q	E	£19.20
4000D/1	Q	4D	£59.00
4000D/11	Q	4D	£87.00
4000D/111	Q	4D	£99.00
2000Z	S	E	£60.00
GOLDRING			
G900SE	S	E	£36.00
GRADO			
FTR	S	Sp	£8.60
FTE	S	E	£13.00
F3E	S	E	£17.00
F2	S	E	£28.00
MICRO			
VF3200/6	S	Sp	£8.00
VF 3200/XE	S	E	£12.00
VF 3200/E	S	E	£15.00
MICRO ACOUSTICS			
QDC-1E	S	E	£39.60
QDC-1q	Q	Qu	£47.60
ORTOFON			
F15	S	Sp	£15.00
F15E	S	E	£18.00
FF15	S	Sp	£15.00
FF15E	S	E	£15.00
VMS 20S	S	Sp	£22.00
VMS 20E	S	E	£26.50
SL15 MKII	S	Sp	£38.50
SL15E MKII	S	E	£46.00
SL15Q	Q	Bi-E	£66.00
M15	S	Sp	£38.50
M15E Super	S	E	£46.00
PHILIPS			
GP400	S	E	p.o.a.
GP401	S	E	p.o.a.
GP412	S	E	p.o.a.
GP422	S	E	p.o.a.
PICKERING			
P/AC	S	Sp	£6.50
P/AT	S	Sp	£8.00
P/ATE	S	E	£10.25
V15 Micro 1V AC	S	Sp	£10.25
V15 Micro 1V ACE	S	E	£11.50
V15 Micro 1V AT	S	Sp	£11.50
V15 Micro 1V AM	S	Sp	£13.50
V15 Micro 1V AME	S	E	£17.00
XV-15/100	S	Sp	£11.50
XV-15/150	S	Sp	£13.50
XV-15/350	S	Sp	£16.00
XV-15/140E	S	E	£16.85
XV-15/400E	S	E	£21.00
XV-15/750E	S	E	£32.50
VX-15/1200E	S	E	£42.50
XUV/2000Q	S/Q	Quh	£39.00
XUV/2400Q	S/Q	Quh	£59.00
XUV:4500Q	S/Q	Quh	£64.00
SHURE			
M3D	S	Sp	£6.00
M44-7	S	Sp	£7.50
M44C	S	Sp	£7.50
M44E	S	E	£8.10
M44G	S	Sp	£7.50
M55E	S	E	£9.00
M75-6S	S	Sp	£8.10
M75CS	S	Sp	£7.80
M75ECS	S	E	£9.60
M91E	S	E	£15.60
M91ED	S	E	£17.10
M91GD	S	Sp	£14.40
M93E	S	E	£12.30
M75B Type 2	S	Sp	£12.60
M75ED Type 2	S	E	£17.10
M75EJ Type 2	S	E	£14.70
M75G Type 2	S	Sp	£13.50
M95ED	S	E	£22.20
M95EJ	S	E	£15.30
M95G	S	Sp	£19.80
V-15 Type III	S	E	£44.70
V-15 Type III-G	S	Sp	£41.70
SONOTONE			
V100	S	Sp	£7.20
V200E	S	E	£13.60
V200S	S	Sp	£8.80
V200EX	S	E	£18.40
STANTON			
500AL	S	Sp	£13.25
500A	S	Sp	£13.25
500E	S	E	£16.75
500EE	S	E	£19.95
681A	S	Sp	£33.80
681EE	S	E	£35.00
681EEE	S	E	£43.95
680EE	S	E	£29.95
TENOREL			
T2001	S	Sp	£5.45
T2001ED	S	E	£10.50
T2001SD	Q	Sh	£17.50
ULTIMO			
DV38-20A	S/Q	Sh	£43.00
DV38-20B	S Q	Sh	£47.00
YAMAHA			
CG5500	S	Sp	£14.40
CG6500	S	Sp	£16.00
CG7000	S	E	£19.20

Tuners

Key: S = stereo

ACCUPHASE			
T-101	S	FM/MW	£245.00
T-100	S	FM/MW	£350.00
ALBA			
UA800	S	FM/MW/LW	£55.96
ALPHA			
TX500	S.	FM/MW	£63.50
FT650	S.	FM/MW	£99.00
0007	S.	FM	£49.50
AMSTRAD			
3000 Mk11	S	FM/MW/LW	£50.00
ARMSTRONG			
623	S.	FM/MW/LW	£111.11
624	S.	FM	£87.11
ATRON			
KT-1000	S	FM/MW	£63.00
BANG & OLUFSEN			
Beomaster 1700	S	FM	£71.60
CAMBRIDGE AUDIO			
T55	S.	FM	£119.00

Audio–T Audio–T Audio–T Audio–T Audio–T Audio–T

'GUILTY'

THE TURNTABLE
THE WHOLE OF THE AMPLIFIER
AND NOTHING BUT THE SPEAKERS

Guilty! yes guilty, every single one. The Hi Fi gang.

Each and every part of your system is responsible — IN COMBINATION for the overall sound. The SYSTEM must be thought of as a WHOLE. Cartridges must complement speakers. Both may be excellent on their own or in other combinations but unless they MATCH one another, they will sound POOR.

Audio T operate a large, fully air conditioned, underground studio containing, on a good day, 50 pairs of speakers, 30 cartridges and a host of turntables and electronics all capable of being instantly switched into any combination.

During weekdays we operate a demonstration by appointment system of one hour duration; — see below for times. Phone for a quote or drop in for a chat; we know our stuff.

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The Audio Consultants

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London NW6 1SQ
Tel. 01-794 7848.

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HI-FI PRICES
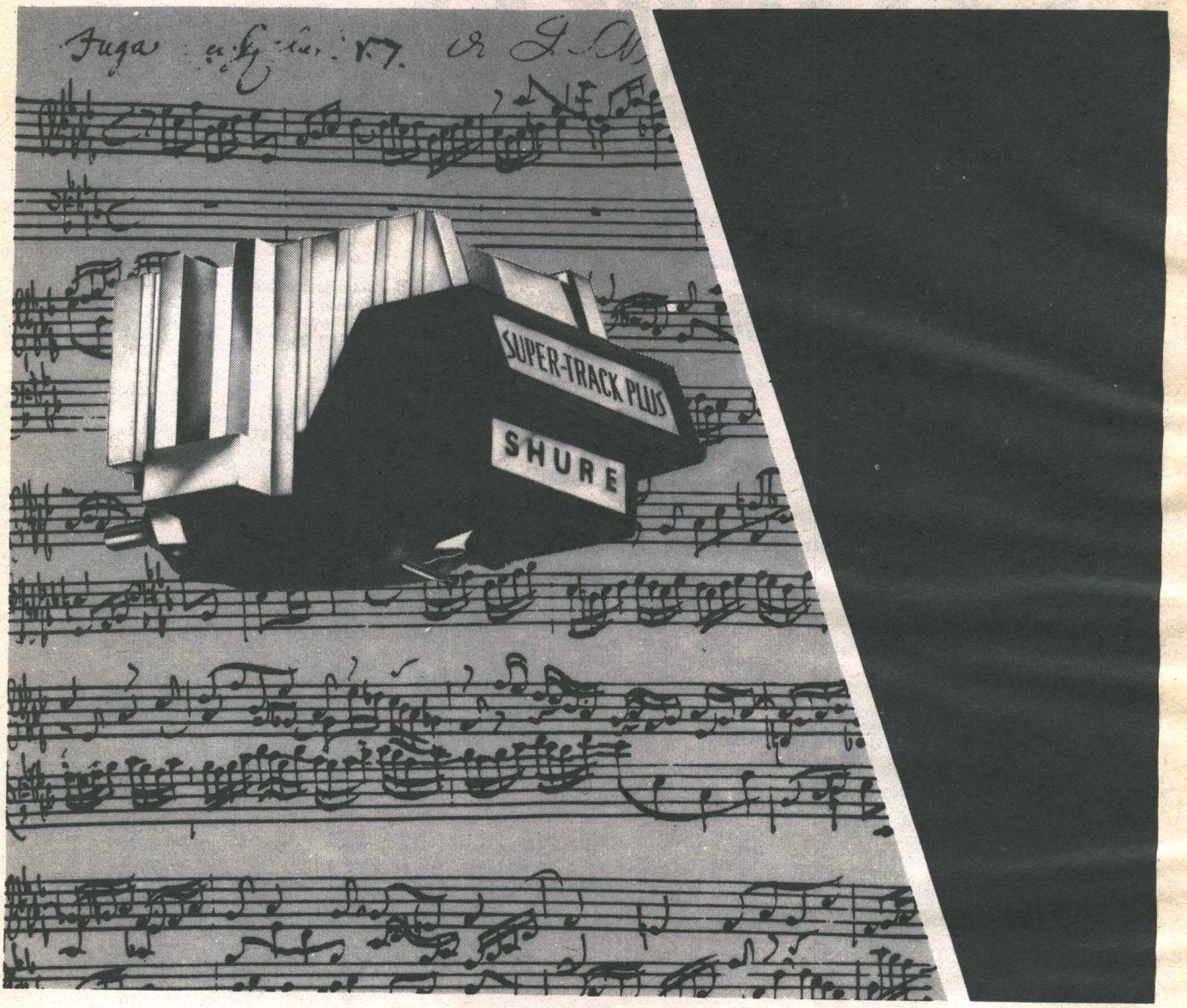
A guide to current Hi-Fi equipment recommended retail prices. All exclude VAT.

MARANTZ			
112	S	FM/MW	£145.00
125	S	FM/MW	£216.00
150	S	FM/MW	£330.00
EAGLE			
T2008	S.	FM/MW	£75.00
AA8	S.	FM/MW	£64.00
AA102	S	FM/MW	£47.20
FERROGRAPH			
SFM1 Mk2	S	FM	£114.00
HARMAN-KARDON			
Citation 15	S.	FM	£342.22
HITACHI			
FT920	S	FM/MW	p.o.a.
FT300	S	FM/MW	p.o.a.
HOWLAND-WEST			
T1000	S	FM/MW	£48.00
JVC			
JT-V310	S.	FM/MW	£85.00
JTV6	S	FM/MW	£118.00
LECSON			
FM1	S	FM	£160.00
LUX			
T33	S	FM/MW	£125.00
T88V	S	FM/MW	£175.00
T110	S	FM	£295.00
PHILIPS			
RH640	S	FM/MW/LW/SW	£76.00
PIONEER			
TX-5300	S.	FM/MW	£85.69
TX-7500	S.	FM/MW	£168.37
TX-9500	S.	FM/MW	£232.77
QUAD			
FM3	S	FM	£85.00
REVOX			
A76	S.	FM	£267.00
ROGERS			
Panthera T75	S.	FM	£87.00
ROTEL			
RT-224	S.	FM/MW	£71.02
RT-324	S.	FM/MW	£91.11
RT-624	S.	FM/MW	£133.24
RT-824	S.	FM/MW	£168.80
RT-1024	S	FM/MW D	£288.89
SANSUI			
TU-3900	S.	FM/MW	£117.55
TU-9900	S	FM/MW	£318.15
SANYO			
FMT 200	S.	FM/MW	p.o.a.
			£63.95
SONY			
ST70	S.	FM/MW	£53.29
ST88	S.	FM/MW	£62.18
ST2950F	S	FM/MW/LW/SW	£88.84
ST3950	S	FM/MW	£137.73
ST4950	S	FM/MW	£151.07
ST5130	S.	FM/MW	£186.62
ST5950	S	FM/MW	£204.40
J. E. SUGDEN			
R21	S	FM	£104.00
R51	S	FM	£104.00
T48	S	FM	£88.00
TECHNICS			
ST-3500	S.	FM/MW	£159.96
ST-7200	S	FM/MW	£74.62
ST-7600	S	FM/MW	£98.62
ST-9600	S	FM/MW	£231.07
TELETON			
T300	S	FM/MW/LW	p.o.a.
TOSHIBA			
ST-910	S	FM	£476.00
ST-220	S.	FM/MW	£84.00
TRIO			
KT1300	S.	FM/MW	£64.44
700T	S.	FM/MW	£466.67
KT-5300	S.	FM/MW	£96.00
KT-7300	S.	FM/MW	£165.33
KT-8300	S.	FM/MW	£244.44
YAMAHA			
CT400	S.	FM/MW	£115.30
CT600	S.	FM/MW	£159.40
CT800	S.	FM/MW	£197.60
CT7000	S.	FM	£533.20

Amplifiers

Key: S = stereo, Q = quadraphonic; power rating continuous both channels driven (20Hz-20kHz); impedance

ACCUPHASE				
C-200	S	Preamp		£330.00
P-300	S	150W	8Ω	£450.00
E-202	S	100W	8Ω	£375.00
ALBA				
UA700	S	15W	8Ω	£55.96
UA900	S	33W	8Ω	£95.96
ALPHA				
AX500	S.	25W	8Ω	£59.50
FA400	S.	20W	8Ω	£49.50
FA600	S.	32W	8Ω	£89.00
AMCRON				
IC150	S	Preamp		£209.00
OC150	S	Preamp		£240.00
D-60	S	30W	8Ω	£180.00
DC300A	S	155W	8Ω	£465.00
M600	S	600W	8Ω	£950.00
AMSTRAD				
2000 Mk111	S	25W	8Ω	£50.00
8000 Mk111	S	10W	8Ω	£33.74
ARMSTRONG				
621	S.	40W	8Ω	£104.89
ATRON				
KA-2015	S	15W	8Ω	£56.00
BANG & OLUFSEN				
Beolab 1700	S	20W	4Ω	£79.60
BGW				
250B	S.	85W	8Ω	£357.00
750A	S.	200W	8Ω	£697.00
500D	S.	200W	8Ω	£587.00
202	S	Preamp		£397.00
1000		to order		£997.00
BOSE*				
4401	Q.	Preamp.		£330.00
1808	S.	250W	8Ω	£590.00
BROWN				—
Mark 1	S.	70W	8Ω	£290.00
CAMBRIDGE AUDIO				
Classic	S.	60W	8Ω	£175.00
P60	S.	30W	8Ω	£139.00
P110	S.	50W	8Ω	£149.00
P5011	S.	25W	8Ω	£99.50
IA80	S	30W	8Ω	p.o.a.
CROWN				
D150A	S	80W	8Ω	£285.00
DENON				
PMA350Z	S	27W	8Ω	£110.20
PMA500	S	37W	8Ω	£144.40
EAGLE				
A2004	S.	20W	8Ω	£69.50
A2006	S.	20W	8Ω	£79.80
AA2	S.	10W	8Ω	£43.90
AA4	S.	20W	8Ω	£59.90
AA6SQL	S.	20W	8Ω	£69.20
FERROGRAPH				
F208 Mk2	S	20W	8Ω	£94.00
F608 Mk2	S	60W	8Ω	£162.00
FISHER				
TX-55	S.	20W	8Ω	£82.00
GOODMANS				
Forty Forty	S	50W	8Ω	£90.13
GRIFFIN				
T.O.C.	S.	Preamp.		£152.27
HARMAN-KARDON*				
Citation 11	S.	Preamp.		£321.77
Citation 12	S.	60W	8Ω	£241.77
Citation 16	S	150W	8Ω	£621.33
A-401	S	20W	8Ω	£105.00
HITACHI				
HA610	S	50W	8Ω	p.o.a.
HA300	S	15W	8Ω	p.o.a.
HOWLAND-WEST				
A2000	S	20W	8Ω	£63.00
JVC				
4VN-550	S/Q.	12·5W(4ch)	8Ω	£99.50
4VN-880	S/Q.	25W (4ch)	8Ω	£180.00
4VN-990	S/Q.	35W (4ch)	8Ω	£279.00
JA-S310	S.	25W	8Ω	£79.50
JA-S8	S	55W	8Ω	£194.00
JA-X9	Q	25W(4ch)	8Ω	£279.00
LEAK*				
2200	S.	45W	8Ω	£138.66
3900A	S	80W	8Ω	£330.47
LECSON				
AC1	S.	Preamp.		£169.00
AP1	S.	60W	8Ω	£123.00
AP3	S.	140W	8Ω	£182.00
LUX*				
L30	S	32W	8Ω	£132.00
L80	S	40W	8Ω	£200.00
L80V	S	50W	8Ω	£240.00
L100	S	110W	8Ω	£550.00
M4000	S	180W	8Ω	£925.00
M6000	S	300W	8Ω	£1375.00
C1000	S	Preamp.		£500.00
M-2000	S	120W	8Ω	£750.00
MARANTZ				
1030	S	15W	8Ω	£89.50
1040	S	20W	8Ω	£137.00
1060	S	30W	8Ω	£137.00
1070	S	35W	8Ω	£154.00
1120	S	60W	8Ω	£317.00
1200B	S	100W	8Ω	£472.00
140	S	75W	8Ω	£206.00
240	S	125W	8Ω	£258.00
250	S	126W	8Ω	£387.00
510	S	256W	8Ω	t.b.a.
510M	S	256W	8Ω	t.b.a.
4070	Q	15W(4ch)	8Ω	£226.00
4140	Q	25W(4ch)	8Ω	£352.00
3200	S	Preamp		£137.00
3600	S	Preamp.		£346.00
3800	S	Preamp.		t.b.a.
NAD				
60	S.	30W	8Ω	£129.00
90	S.	50W	8Ω	£157.00
NAIM				
NAP 120	S	40W	8Ω	£105.00
NAC12	S	Preamp.		£95.00
NAP160	S	50W	8Ω	£215.00
ONLIFE				
DV 3000	Valve preamp			
DV 8250	S Valve amp			t.b.a.
DV 8050	M Valve amp			
PHILIPS				
RH551	S	Preamp		£127.60
RH521	S	30W	4Ω	p.o.a.
PIONEER*				
C3	S.	Preamp.		£846.90
M3	S.	168W	8Ω	£912.03
SA-5300	S	10W	8Ω	£76.32
SA-6300	S	20W	8Ω	£93.96
SA-7300	S	35W	8Ω	£144.55
SA-7500	S	40W	8Ω	£211.68
SA-8500	S	60W	8Ω	£241.08
SA-9500	S	80W	8Ω	£323.38
SA-9900	S	110W	8Ω	£479.82
Spec. 1	S	Preamp		£439.90
Spec. 2	S	250W	8Ω	£589.78
QUAD				
33	S	Preamp		£78.00
303	S	45W	8Ω	£85.00
405	S	100W	8Ω	£126.50



The Test of Time.



Critics were most generous in their praise when the Shure V-15 Type III pickup cartridge was introduced. The ultimate test, however, has been time. The original engineering innovations, the uniquely uniform quality and consistent performance reliability of the V-15 Type III have made it THE classic choice as the source of sound for the finest music systems, both here and abroad.

Consider making the relatively modest investment of a new cartridge to upgrade the performance of your entire hi-fi system. Why not ask Shure Electronics Limited for their recommendation?

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I am at present using

Arm or Unit

Cartridge

Amplifier

Name

Address

Please recommend the best Shure cartridge to upgrade my system.

SHURE®

HI-FI PRICES

A guide to current Hi-Fi equipment recommended retail prices. All exclude VAT.

REVOX				
A78 Mk11	S	40W	8Ω	£229.00
A722	S	45W	8Ω	£205.00
ROGERS				
Panthera A75	S.	37·5W	8Ω	£95.00
ROTEL*				
RA-212	S.	10W	8Ω	£65.33
RA-312	S.	18W	8Ω	£79.91
RA-412	S.	25W	8Ω	£97.69
RA-812	S.	45W	8Ω	£171.11
RA-1412	S.	110W	8Ω	£377.78
RA-1312	S	80W	8Ω	£288.89
SANSUI*				
AU9900	S	80	8Ω	£432.81
AU11000	S	110W	8Ω	£532.69
AU20000	S	170W	8Ω	£712.48
CA3000	S	Preamp		£513.72
BA3000	S	170W	8Ω	£563.37
BA5000	S	300W	8Ω	£809.37
AU-3900	S	22W	8Ω	£110.71
AU-4900	S	35W	8Ω	£134.16
SANYO				
DCA200	S.	15W	8Ω	£63.95
SONAB				
P4000	S.	40W	8Ω	£133.84
SONY				
TA70	S.	8W	8Ω	£53.28
TA88	S.	10W	8Ω	£62.18
TA1630	S	22W	8Ω	£75.51
TA2650	S	43W	8Ω	£97.73
TA3650	S	55W	8Ω	£137.73
TA3140F	S	35W	8Ω	£97.73
TA5650	S	60W	8Ω	£204.40
TA8650	S	90W	8Ω	£488.84
STEEPLETONE				
STA1	S	10W		£32.50
J. E. SUGDEN				
C51	S	Preamp		£80.00
P51	M/S	50W	8Ω	£96.00
A21	S	20W	8Ω	£120.00
A48	S	40W	8Ω	£144.00
TANDBERG				
TA300M	S.	25W	8Ω	£132.44
TECHNICS*				
SU-3500	S.	43W	8Ω	£177.73
SE-9600	S.	110W	8Ω	£462.18
SU-9600	S.	Preamp.		£324.40
SU-7200	S	20W	8Ω	£71.07
SU-7600	S	40W	8Ω	£95.07
SU-8600	S	73W	8Ω	£231.07
TOSHIBA*				
SB-300	S	15W	8Ω	£72.80
SB-500	S	30W	8Ω	£127.20
SB-220	S	22W	8Ω	£88.44
TRIO*				
KA1200	S	13W	8Ω	£52.89
700C	S	Preamp		£320.00
700M	S	175W	8Ω	£469.33
KA-3500	S	40W	8Ω	£96.00
KA-5500	S	55W	8Ω	£161.78
KA-7300	S	65W	8Ω	£204.44
KA-8300	S	80W	8Ω	£271.11
600	S	130W	8Ω	£480.00
YAMAHA*				
CA400	S	20W	8Ω	£115.30
CA600	S	30W	8Ω	£177.60
CA800II	S	45W	8Ω	£248.00
CA1000II	S	70W	8Ω	£328.00

Receivers

Key: S = stereo, Q = quadraphonic; power rating continuous both channels driven (20Hz-20kHz); impedance

AIWA*				
AX 7500	S	FM/MW 30W	8Ω	£186.84
AKAI				
AA-1020	S	FM/MW 20W	8Ω	£195.11
AA-1030	S	FM/MW 30W	8Ω	£217.78
ALBA				
UA100D	S	FM/MW/LW/SW15W	8Ω	£83.20
ALPHA				
FR5000	S.	FM/MW 15W	8Ω	£99.00
FR6000	S.	FM/MW 20W	8Ω	£115.00
FR8000	S.	FM/MW 45W	8Ω	£169.00
AMSTRAD				
5000	S	FM/MW/LW 25W	8Ω	£86.87
ARMSTRONG				
625	S	FM 40W	8Ω	£159.11
626	S	FM/MW/LW 40W	8Ω	£184.00
ATRON				
KR-215	S	FM/MW 15W	8Ω	£89.00
KR-220	S	FM/MW 20W	8Ω	£109.00
BANG & OLUFSEN				
Beomaster 901	S	FM/MW/LW 20W	4Ω	£127.60
Beomaster 1100	S	FM 22W	4Ω	£119.60
Beomaster 2000	S	FM/MW/LW 40W	4Ω	£215.60
Beomaster 3400	S/Q	FM 20W(4ch)	4Ω	£260.40
Beomaster 4000	S	FM 60W	4Ω	£238.80
Beomaster 6000	Q	FM 40W(4ch)	4Ω	£446.80
DANSK				
900	S.	FM/MW 20W	4Ω	£115.56
2100	S.	FM/MW 30W	4Ω	£140.45
2300	S.	FM 25W	4Ω	£143.02
5000	S.	FM/MW 40W	4Ω	£235.26
EAGLE				
AA28	S.	FM/MW 30W	8Ω	£128.00
AA30	S.	FM/MW 30W	8Ω	£142.00
R2020	S	FM/MW 20W	8Ω	£126.40
FISHER				
122	S.	FM/MW 15W	8Ω	£99.00
222	S.	FM/MW 20W	8Ω	£129.00
234	S/Q.	FM/MW 12.5W(4ch)	8Ω	£183.00
634	S/Q.	FM/MW 34W (4ch)	8Ω	£499.00
314	S/Q.	FM/MW 15W (4ch)	8Ω	£359.00
414	S/Q.	FM/MW 22W (4ch)	8Ω	£399.00
514	S/Q.	FM/MW 32W (4ch)	8Ω	£450.00
GOODMANS				
Module 90	S	FM/MW 30W	8Ω	£144.37
One-Ten	S	FM/MW/LW/SW40W	8Ω	£163.77
1-20	S	FM/MW/LW/SW40W	8Ω	£163 77
1-50	S	FM/MW/LW 70W	8Ω	£239.20
HARMAN KARDON*				
330	S.	FM/MW 22.5W	8Ω	£155.55
430	S	FM/MW 25W	8Ω	£195.55
630	S.	FM/MW 30W	8Ω	£189.00
930	S.	FM/MW 45W	8Ω	£259.00
50+	S/Q	FM/MW 12W (4ch)	8Ω	£139.00
75+	S/Q.	FM/MW 18W (4ch)	8Ω	£219.00
800+	S/Q.	FM/MW 18W (4ch)	8Ω	£279.00
900+	S/Q	FM/MW 32W (4ch)	8Ω	£369.00
HITACHI				
SR302	S	FM/MW 15W	8Ω	p.o.a.
SR502	S	FM/MW 20W	8Ω	p.o.a.
SR802	S	FM/MW 50W	8Ω	p.o.a.
SR6100	S	FM 20W	8Ω	p.o.a.
SMR 5240	S/Q	FM/MW 10W(4ch)	8Ω	p.o.a.
SMR 7240	S/Q	FM/MW 7W(4ch)	8Ω	p.o.a.
HOWLAND-WEST				
R100	S	FM/MW 20W	8Ω	£115.00
JVC				
4VR-5456	S/Q.	FM/MW 48W (4ch)	8Ω	£425.00
4VR-5446	S/Q.	FM/MW 26W (4ch)	8Ω	£320.00
4VR-5426X	S/Q.	FM/MW 17W (4ch)	8Ω	£210.00
VR-5525L	S	FM/MW/LW 26W	8Ω	£195.00
VR-5505L	S	FM/MW/LW 10W	8Ω	£112.00
LEAK*				
3200	S	FM/MW/LW 25W	8Ω	£200.57
3400	S	FM/MW 35W	8Ω	£251.32
LUX				
R-600	S	FM/MW 30W	8Ω	£225.00
R-800	S	FM/MW 40W	8Ω	£270.00
R-1500	S	FM/MW 75W	8Ω	£400.00
MARANTZ				
2230	S	FM/MW 30W	8Ω	£269.68
2325	S.	FM/MW 125W	8Ω D	£619.38
4240	Q	FM/MW 17W(4ch)	8Ω D	£407.48
4270	Q	FM/MW 25W(4ch)	8Ω D	£470.87
4300	Q	FM/MW 40W(4ch)	8Ω D	£633.48
4400	Q	FM/MW 50W(4ch)	8Ω D	£814.96
2275	S	FM/MW 75W	8Ω	£536.80
2250B	S	FM/MW 50W	8Ω	£432.39
2235B	S	FM/MW 35W	8Ω	£331.82
2225	S	FM/MW 25W	8Ω	£208.72
2215B	S	FM/MW 15W	8Ω	£143.07
2215BL	S	FM/MW/LW 15W	8Ω	£158.46
NAD				
140	S.	FM/MW 30W	8Ω	£195.00
160a	S.	FM/MW 50W	8Ω	£228.00
NYTECH				
CTA 252	S	FM 25W	4Ω	£123.00
PIONEER				
SX300	S	FM/MW 7W	8Ω	£93.24
SX450	S	FM/MW 15W	8Ω	£138.96
SX550	S	FM/MW 20W	8Ω	£171.79
SX650	S	FM/MW 35W	8Ω	£241.12
SX750	S	FM/MW 50W	8Ω	£286.93
SX850	S	FM/MW 65W	8Ω	£382.62
SX950	S	FM/MW 85W	8Ω	£439.29
SX1250	S	FM/MW 160W	8Ω	£673.60
REVOX				
A720	S	FM Preamp		£650.00
ROTEL				
RX-102 Mk II	S.	FM/MW 10W	8Ω	£95.56
RX-152 Mk II	S.	FM/MW 15W	8Ω	£110.67
RX-202 Mk II	S.	FM/MW 20W	8Ω	£122.22
RX-402	S.	FM/MW 25W	8Ω	£171.11
RX-602	S.	FM/MW 35W	8Ω	£217.33
RX-802	S.	FM/MW 50W	8Ω	£273.33
RX1603	S	FM/MW 180W	8Ω	£555.56
RX7707	S	FM/MW 35W	8Ω	£237.78
SALORA				
2000	S.	FM 21W	8Ω	£115.00
SANSUI*				
221	S	FM/MW 8W	8Ω	£111.50
331	S	FM/MW 12W	8Ω	£123.92
551	S	FM/MW 16W	8Ω	£161.91
661	S	FM/MW 25W	8Ω	£207.51
771	S	FM/MW 40W	8Ω	£257.52
881	S	FM/MW 63W	8Ω	£333.17
8080	S	FM/MW 80W	8Ω	£420.85
9090	S	FM/MW 110W	8Ω	£462.75
QRX7001	Q	FM/MW 35W (4ch)	8Ω	£570.57
SANYO				
DCX 1850K	S.	FM/MW 11W	8Ω	£74.50
DCX 2000K	S.	FM/MW 13W	8Ω	£95.95
DCX 4000K	S.	FM/MW 22W	8Ω	£113.95
DCX 6000K	S.	FM/MW 33W	8Ω	£133.50
DCX 8000K	S.	FM/MW 47W	8Ω	£149.50
SONAB				
R7000-3	S.	FM/MW 40W	8Ω	£235.79
R4000-2	S.	FM/MW 40W	8Ω	£175.88
R3000	S.	FM/MW 28W	8Ω	£157.36
SONY				
STR7015	S.	FM/MW 16W	8Ω	£119.95
STR7025	S.	FM/MW 20W	8Ω	£133.29
STR7035	S.	FM/MW 26W	8Ω	£151.07
STR7055A	S.	FM/MW 40W	8Ω	£199.95
TANDBERG				
TR-2075	S.	FM/MW 75W	8Ω	£400.00
TR-1040P	S.	FM/MW 40W	8Ω	£231.II
TR-220	S.	FM 14W	8Ω	£141.33
Huldra 10	S	FM/MW/LW/SW	25W 8Ω	£248.00
TR2055	S	FM	55W 8Ω	£311.II
SS12	S	FM/MW/LW/SW	12W 8Ω	£173.33
TECHNICS				
SA5060	S	FM/MW 13W	8Ω	£97.73
SA5160	S	FM/MW 25W	8Ω	£133.29
SA5360	S	FM/MW 38W	8Ω	£173.29
SA5460	S	FM/MW 65W	8Ω	£257.78
TOSHIBA*				
SA-300L	S	FM/MW/LW 14W	8Ω	£108.00
SA-500	S	FM/MW 30W	8Ω	£159.60
SA-220L	S	FM/MW/LW 7W	8Ω	£79.55
SA-320L	S	FM/MW/LW 14W	8Ω	£111.60
SA-420	S	FM/MW 25W	8Ω	£143.60
SA-520	S	FM/MW 30W	8Ω	£193.33
SA-620	S	FM/MW 50W	8Ω	£277.78
SA-420	S	FM/MW 20W	8Ω	£150.66
SA-320L	S	FM/MW/LW 14W	8Ω	£117.78
WHARFEDALE				
SXP	S	FM/MW/LW 35W	6Ω	£183.88

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Model	Measurements		Sensitivity Pink Noise W at 1M=90 dB	Power Handling Peak Music	Suggested Amp Watts RMS		Frequency Response
	Centimetres	Inches			Min	Max	
Ditton 11	35 × 20 × 25	14 × 8 × 10	9·9	25 W	15	30	35 Hz – 28 KHz
Ditton 15	53 × 24 × 23	21 × 9½ × 9¼	4·2	30 W	10	30	30 Hz – 15 KHz
Ditton 33	61 × 35 × 26	24 × 14 × 10¼	5·5	40 W	20	50	40 Hz – 28 KHz
Ditton 44	76 × 37 × 25	30 × 14½ × 10	4·0	44 W	20	50	30 Hz – 40 KHz
Ditton 25	81 × 36 × 28	32 × 14 × 11	2·9	60 W	15	60	20 Hz – 40 KHz
Ditton 66	100 × 38 × 29	40 × 15 × 11½	4·8	80 W	20	80	16 Hz – 40 KHz
UL 6	29 × 41 × 22	11½ × 16 × 8¾	13·0	40 W	20	40	35 Hz – 28 KHz
UL 8	58 × 28 × 23	23 × 11 × 9¼	8·4	50 W	15	50	30 Hz – 28 KHz
UL 10	67 × 31 × 38	26½ × 12½ × 15	18·0	100 W	25	100	20 Hz – 40 KHz

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Why BASF's LH Super will be used to establish international tape standards.

A lot of people are using our LH Super for more than just a good recording.

They're using it as a quality reference for adjustments on cassette machines.

But the compliments don't stop there.

Take the DIN people for instance. They'll be using our LH Super for the new DIN standard for ferric tapes.

We'd like to explain why. The LH principle was developed by BASF back in 1967. LH tape uses smaller ferric particles for less noise, at a greater density for higher output.

BASF LH Super extends this principle on both sides by using the smaller and more evenly-sized particles of Maghemite, with a completely new High Density coating process.

This gives it a signal-to-noise ratio (at 5% distortion) of 58dB without Dolby. Climbing to a massive 67dB with Dolby.

We'll put it another way.

On an unbiased cassette machine an LH Super cassette gives a full, clear recording over a much wider range of sounds than ordinary ferric oxide.

On a quality cassette recorder with Dolby, LH Super dramatically decreases distortion and gives a sound quality that is almost indistinguishable from a live broadcast or master tape.

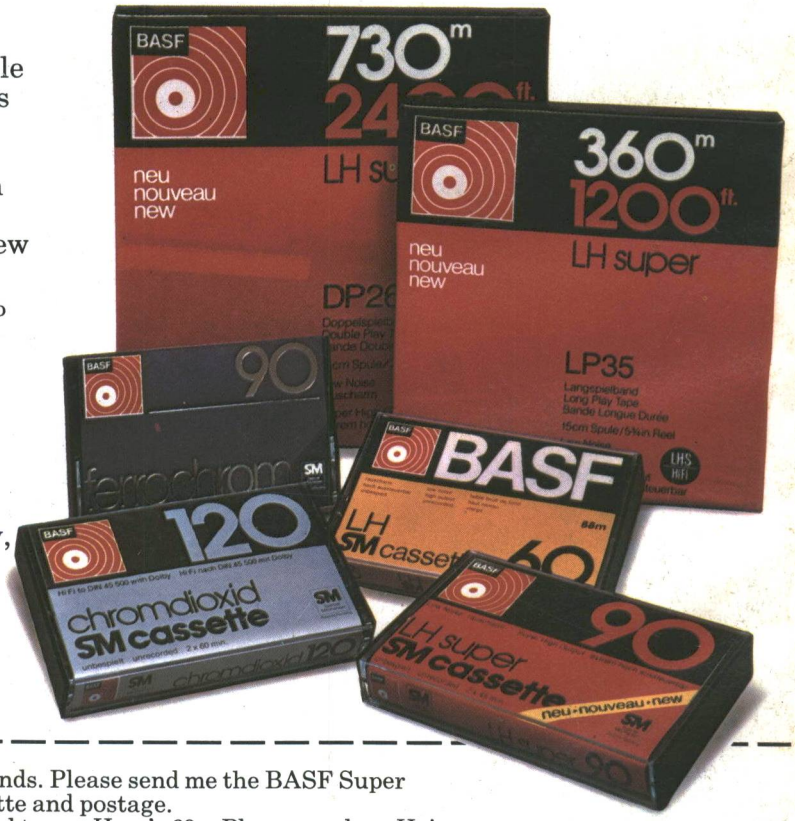
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Of course, this does make things a lot harder for every other ferric oxide tape.

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☐ I am also interested in knowing more about cassettes and tapes. Here's 60p. Please send me Heinz Ritter's book.

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